



REGULAR ARTICLE

## PHENOLICS QUANTIFICATION IN SOME GENOTYPES OF *CAPSICUM ANNUUM* L.

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### SUMMARY

Total phenolic contents of fruits at three ripening stages (green, intermediate and red) from nine genotypes of *Capsicum annuum* L. were analyzed. Among the genotypes *C. annuum* var. Paprika (C.a.2) had highest amount of phenolic contents i.e.,  $188.0 \pm 0.44$ ,  $220.0 \pm 0.52$  and  $266.0 \pm 0.30$  mg/100gFW from green, intermediate and red ripening respectively. The study revealed that high content of phenolics were found in fruits at red ripening. The variability of phenolic contents in the genotypes suggests that these selected genotypes may be use full as parents in hybridization programs to produce fruits with good nutritional values.

**Key words:** Chili pepper, Gallic acid, Phenolics, Ripening

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### 1. Introduction

Phenolic compounds are plant secondary metabolites that are derived from pentose phosphate and phenylpropanoid pathways and possess a wide span of physiological functions viz., antioxidant, anti-carcinogenic, anti-inflammatory, anti-allergenic, anti-atherogenic, anti-microbial, anti-thrombotic, cardio-protective and vasodilatory effects to a greater or lesser extent [1-3]. Fruits, vegetables and beverages are the principal dietary sources of phenolic compounds. Chili pepper (*Capsicum annuum* L.) is an economically important cash crop plant belonging to the family Solanaceae, two main consumption types of spice and vegetable are prevalent throughout the world. They are extremely popular for the abundance content of vitamin C and total soluble phenolics larger than other vegetables commonly recognized as a source of this substance [4-5]. Total phenolic contents have been reported in chili peppers (*Capsicum* L.) by few workers [6-10]. Variability of phenolic contents in genus *Capsicum* has been reviewed by Antonious et al [11]; however, very scanty information was reported on phenolic contents during ripening in chili pepper fruits [12-16]. Therefore, the present study was undertaken to quantitative evaluation of

phenolic contents in nine genotypes of chili pepper (*Capsicum annuum* L.) fruits during ripening and to select genotypes having high content of phenolics as parents in breeding programs.

### 2. Materials and Methods

Nine cultivars of *C. annuum* L., were obtained from Sutton and Seeds, Calcutta, India. They were grown in randomized design with three replicates at the Experimental Farm of Andhra University, Visakhapatnam. The healthy fruits were harvested at three ripening stages viz., Green, Intermediate (turning) and Red. The fruits were washed with distilled deionised water and cut into small pieces and homogenized with the help of mortar and pestle by adding 5ml of 80% ethanol. Then the extracts were filtered with Whatman no. 1 filter paper under vacuum and the residues were repeatedly extracted with the same solvent until they were colourless [17]. The ethanol in the extracts was removed and concentrated by a rotary evaporator at 50°C. Total phenolic contents were determined with Folin-Ciocalteu reagent according to the method of Sadasivam and Manickam [18]

using Gallic acid as a standard phenolic compound. Briefly, 1ml of approximately diluted samples and a standard solution of Gallic acid were added to a 25ml volumetric flask containing 9ml of distilled water. A reagent blank using distilled water was prepared. 0.5ml of Folin-Ciocalteu reagent was added to the mixture and shaken. After 5min, 10ml of 20%Na<sub>2</sub>CO<sub>3</sub> solution was added with mixing and then allowed to stand for 2h. The absorbance was measured with spectrophotometer at 650nm. The concentration of total phenolic contents was determined as milligram of gallic acid equivalent by using an equation that was obtained from standard Gallic acid graph, five samples from each lot were analyzed.

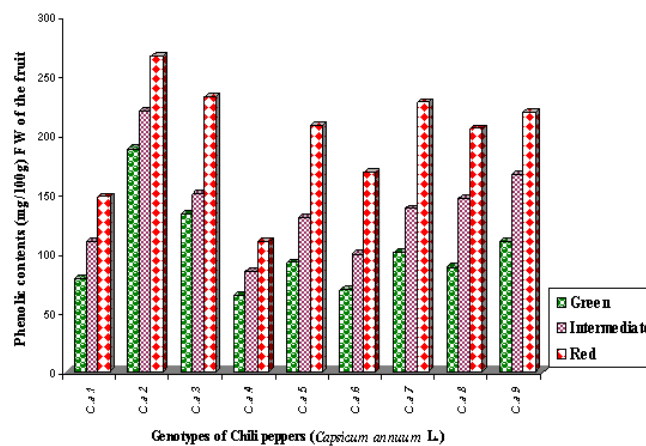
### 3. Results and Discussion

The total phenolic concentrations of nine genotypes of Chili pepper (*Capsicum annuum* L.) fruits at three ripening (green, intermediate and red) was investigated and are shown in (Table 1 and Fig. 1). The results showed that a gradual increase of phenolics concentration was observed from green to red ripening, these results were confirmed by the works of Deepa et al [13] Leja et al [16]. Noticeable differences of total phenolics were found in the genotypes ranged from 64 to 266mg/100g FW. Among the genotypes *C.annuum* var. Paprika (*C.a.2*) had highest amount of total phenolics i.e., 188.0±0.44 (Green),

220.0±0.52 (Intermediate) and 266.0±0.30 (Red), while *C.annuum* var. NP.46A (*C.a.4*) possessed the lowest amounts i.e., 64.0±0.82, 85.0±0.19and 110.0±0.25mg/100g FW from green, intermediate and red ripening stages respectively. Based on the mean phenolic contents the genotypes were classified into three categories viz., low (0-100mg/100g FW), medium (101-200mg/100g FW) and high (201-300mg/100gFW) however, most of the chili peppers in the present investigation fall under high category at red ripening. The results were supported by previous observations [7,12-13,11,8,16] who found that high content of phenolics in chili pepper fruits at red ripening stage. On the other hand differ from what has been reported by Marinova et al [4] Navarro et al [14] who found that fruits at green ripening stage represented more phenolics concentration. The present study revealed that high content of phenolics was pronounced in red ripening, this could be the over estimation of phenolics due to high concentration of ascorbic acid to the Folin - Ciocalteu reagent. A similar view point is also shared by Asami et al [19] Navarro et al [14]. Our results suggests that six genotypes, (i.e., *C.a.2*,*C.a.3*,*C.a.7*,*C.a.9*, *C.a.5*, *C.a.8*) (Table 1) showed best phenolic contents ranged from 88-266mg/100g FW can be recommended in breeding programs to produce high phenolic content varieties.

Table 1. Total phenolic contents of chili pepper (*Capsicum annuum* L.) fruits during ripening

Genotype	Phenolic contents(mg/100g) fruit fresh weight		
	Stage of ripening		
	Green	Intermediate	Red
<i>C.annuum</i> var. PC1( <i>C.a.1</i> )	78.5±0.76	110.0±0.19	147.5±0.30
<i>C.annuum</i> var. Paprika( <i>C.a.2</i> )	188.0±0.44	220.0±0.52	266.0±0.30
<i>C.annuum</i> var. Pusa Jwala( <i>C.a.3</i> )	133.0±0.34	150.0±0.29	232.0±0.39
<i>C.annuum</i> var. NP.46A( <i>C.a.4</i> )	64.0±0.82	85.0±0.19	110.0±0.25
<i>C.annuum</i> var. LCA-206( <i>C.a.5</i> )	92.0±0.35	130.0±0.52	208.0±0.62
<i>C.annuum</i> var. Jwala( <i>C.a.6</i> )	69.0±0.22	99.0±0.45	168.0±0.19
<i>C.annuum</i> var. Selection-77( <i>C.a.7</i> )	100.5±0.27	137.8±0.26	227.3±0.26
<i>C.annuum</i> var. G-4( <i>C.a.8</i> )	88.0±0.14	146.0±0.62	205.0±0.44
<i>C.annuum</i> var. G-5( <i>C.a.9</i> )	110.0±0.55	166.0±0.28	219.0±0.90
Significant at 1% level			

Fig. 1. Phenolic contents of chili pepper (*Capsicum annuum* L.) fruits at three ripening stages; Bars: mean value of phenolic contents

#### 4. Conclusions

Total phenolic amounts of fruits during ripening (green, intermediate and red) from nine cultivars of *Capsicum annuum* L. showed variation with one another. A maximum amount of phenolics was recorded in genotype *C.annuum* var. Paprika (*C.a.2*) i.e., 188.0±0.44, 220.0±0.52 and 266.0±0.30mg/100gFW from green, intermediate and red ripening respectively, than any other cultivar in the

present study. The study revealed that high phenolic contents were found in fruits at red ripening.

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