

Changes in total phenolics and total antioxidant activity of kair (*Capparis decidua*) fruits during maturity

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Capparis decidua (Forsk.) Edgew (Capparidaceae), commonly known as Kair, is a hardy plant, resistant to almost all type of abiotic stresses like heat, cold, drought salinity etc. naturally grow in arid region of India specifically Rajasthan, Haryana, MP, Gujarat states. This plant is also a vital component in nutritional and income security of the rural peoples, especially in the arid region. Besides many socioeconomic and ecological benefits, all parts of this plant have a number of medicinal properties. The plant is traditionally used to cure toothache, arthritis, cough, asthma, inflammation, intermittent fevers, malaria, rheumatism, and swelling. It is also believed to possess laxative, astringent and vermi-fuge properties (Jeseph and Jini, 2011; Singh *et al.* 2011). The alcoholic extract of fruit pulp and root bark is reported to have anthelmintic activity (Singh and Singh, 2011) and the seeds oil is edible when processed and which contain nitrogen and sulphur, so used to cure skin problems (Singh *et al.* 2011; Baloda and Bangarwa, 2010). The blanched fruit is used as a vegetable, green berries are used in food preparations such as pickles and fully ripe fruits are consumed as fresh since ripe fruits has a unique type sweet test (Baloda and Bangarwa, 2010). Zia-Ul-Haq *et al.* (2011) studied the proximate composition, amino acids, fatty acids, tocopherols, sterols, glucosinolate and phenolic content in extracts obtained from different aerial parts of *C. decidua*, reported its antidiabetic and antioxidant activity. But there is no study on kair fruits regarding which maturity stage possess highest phenolic content and antioxidant activity. In this study we reported the changes happening during fruits ripening with regard to its phenolic content and total antioxidant activity.

Fresh fruits of *Capparis decidua* (Forsk.) Edgew (kair) of different maturity stages (Tender to fully ripe) were harvested from the ICAR-CIAH, Bikaner research farm during April-May, 2017 and divided in five groups as per their maturity stages as stage 1 (Tender fruits), stage 2 (Little mature fruits), stage 3 (Medium Mature fruits), stage 4 (Mature fruits) and stage 5 (fully ripe Fruits) as shown in Figure 1. from each group 10 fruits were counted and weighed to note the average fresh fruit weight, these weighed fruits were subjected to drying in oven at $60 \pm 3^\circ\text{C}$ till the constant weight and calculated the percent dry matter content. The dried samples were ground using kitchen milling machine and passed through 100 micron sieve for getting uniform samples and extracted with 70 % ethanol for total phenolic and total antioxidant activity estimations. Total phenolic content was

determined with the Folin- Ciocalteu reagent (Medini *et al.* 2014) and expressed as mg GAE/g DW. Total antioxidant activity (TAA) of the ethanolic extract was determined by DPPH radical scavenging activity by following the method of Re *et al.* (1999) and expressed as mg Vit C equi./g DW. All analyses were performed in triplicate and values expressed as the mean \pm standard deviation. Data analysis was carried out using the analysis of variance and OPSTATE statistical computer package ([www. http://hau.ac.in/about/opstat.php](http://hau.ac.in/about/opstat.php))

In the present study, Ker fruits of different maturity stages (shown in figure 1) were analyzed for changes in their average fruit weight, dry matter content, total phenolic content and total antioxidant activity along with maturity. A significant difference was observed in all the analyzed parameters along with fruit maturity (Table 1). A significant increase in average fruit weight was observed with maturity, it increase from 0.38 g to 4.11 g per fruits. The increase in average fruits weight is a natural phenomenon of fruit development as deposition of nutrients in sink part of the plant with fruit growth is happen. While, It was observed that dry matter content is continuously decreased from 30.31% (stage 1) to 23.22% (stage 5), it was decreased slowly till maturity stage 4 but a drastic reduction was observed between maturity stage 4 to stage 5. Total phenolic content and total antioxidant activity were also increased from maturity stage 1 to stage 5. Total phenolic content increased from 3.98 mg GAE/g to 4.96 mg GAE/g while total antioxidant activity increased from 0.64 mg Vit.C equi./g to 1.57 mg Vit.C equi./g respectively from maturity stage 1 to stage 5. For total phenolic content and total antioxidant activity, a non-significant increment was observed till the maturity stage 3 but afterward a significant increase



Table 1. Fresh Fruit weight, Dry matter %, phenolic content and Total antioxidant activity of kair (*Capparis decidua*) fruits at different maturity stages.

S.No.	Maturity Stages	Fresh Fruit weight (g)	Dry Matter content(%)	Total Phenol (mg GAE/g DW)	Total antioxidant activity (mg Vit C Equi./g DW)
1	Stage 1	0.38	30.31	3.98	0.64
2	Stage 2	0.94	29.03	4.03	0.75
3	Stage 3	1.34	28.61	4.22	0.81
4	Stage 4	2.84	27.49	4.64	0.87
5	Stage 5	4.11	23.22	4.96	1.57
	C.D.	0.09	0.81	0.28	0.17
	SE(m)	0.03	0.25	0.09	0.05

*GAE- Gallic acid equivalent, DW-Dry weight basis

was observed in both the parameters (Table 1). Studies on the presence of phenolic compounds and antioxidant compounds in kair fruits were also reported by Tlili *et al.* (2010) and Zia-Ul-Haq *et al.* (2011). The absolute values reported by these scientists for phenolic compounds are somehow differed from our values. This difference might be due to difference in extraction method or standard compound used, since they expressed against catechin while we expressed against gallic acid.

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