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Emblicanin A Content and other Fruit Characters in Different Cultivars of Aonla (*Emblica officinalis*) Grown in Arid Region of Rajasthan

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Emblica officinalis (Gaertn.), known as aonla (family Euphorbiaceae), is found all over India, as well as Sri Lanka, Malaysia, China, Pakistan and Bangladesh and its fruits are a reputed ayurvedic rasayan, used for treatment of several disorders such as common cold, scurvy, cancer and heart diseases (Chopra *et al.*, 1956).

Aonla fruits were believed to be a rich source of vitamin C and the prophylactic, curative and restorative effects of the fruits were thought to be mainly due to this factor (Anonymous, 1952). However, a recent comprehensive study (Ghosal *et al.*, 1996) has shown that vitamin C is not present in free or masked form in fresh juice extractive of aonla, dispelling long existing belief that beneficial effects of aonla are due to Vitamin C. It was suggested that vitamin C-like activity of aonla was due to the presence of low molecular weight (<1000) hydrolysable tannins, mainly Emblicanin A and B (Ghosal *et al.*, 1996). Emblicanin A and B have been shown to exhibit significant anti-oxidant effect *in vitro* (Ghosal *et al.*, 1996) and *in vivo* (Bhattacharya *et al.*, 1999).

An attempt has been made to evaluate variations in the content of emblicanin A (EA) in six cultivars of aonla grown in arid region of Rajasthan. It is difficult to isolate emblicanins from aonla fruits in pure form for its use as reference standard during their estimation by HPLC. Only EA is being reported in this communication.

Uniform sized fruits from six 10-year-old cultivars of aonla (Table 1) grown in CR Farm of this Institute were collected in the last week of January 2002. The HPLC analyses were performed using a Shimadzu LC system fitted with LC-10 AD pumps in isocratic mode, a Reodyne 7161 injector with 20 l loop, Shim pack CLC-ODS stainless steel column (15 cm x 4.6 mm ID with 5 µm particle size), and UV spectromonitor (SPD-10A). The data were collected and processed by Winchrom-Ex software. The operating conditions were as follows: mobile phase 50 mM sodium phosphate buffer (pH 6.8)-methanol (9:1) at flow rate 1 ml/min; detector wavelength, 245 nm; sensitivity, 0.02 AUFS; column temperature 27°C. Suitable aliquots of test samples (5-10 µl) were injected with Hamilton syringe. EA in pure form (95%) was isolated from fresh fruit following Ghosal *et al.* (1996) to prepare standard curve.

Fresh fruits (5 g) were homogenized with 3% meta phosphoric acid (3 x 10 ml), centrifuged and the supernatant was filtered through G-4 glass filter and an aliquot was subjected to HPLC. Each analysis was carried out in three replications. Chromatogram of the test samples showed a peak at 2.67 min retention time and was

Table 1. Physico-chemical characteristics of different aonla cultivars

Cultivars	Fruit yield* (kg tree^{-1})	Fruit length (cm)	Fruit breadth (cm)	Fruit weight (gram)	Pulp/ stone ratio	EA content#	EA yield (g tree^{-1})
Banarasi	28.25 (17.64)	3.17	3.61	25.00	13:1	452.68	118.73
Chakaiya	47.00 (25.20)	3.19	3.95	29.00	16:1	468.15	207.06
Francis	29.87 (24.54)	3.44	3.86	29.75	20:1	703.91	200.26
Kanchan	155.00 (96.36)	2.94	3.20	20.00	17:1	952.64	1394.47
Krishna	23.12 (14.51)	3.95	4.33	41.00	22:1	841.87	186.13
NA-7	36.33 (24.58)	3.14	4.0	29.25	16:1	526.20	179.90
LSD (P =0.05)	6.01	NS	0.60	5.75	4.28	100.5	100.5

* Data in parenthesis are the average yield of last four years; NS: Non-significant.
\# EA content is expressed in mg/100 g of fresh pulp.

assigned to EA as standard solution of EA also gave a peak at 2.65 min. The quantity of EA in the test samples was calculated from the standard curve.

The fruit weight, size, pulp/stone ratio, fruit yield and EA content varied significantly amongst cultivars (Table 1). The EA content of cv Kanchan (952.64 mg/100 g) was significantly higher over remaining cultivars. The EA content in different cultivars ranged from 452.68 mg/100 g (Banarasi) to 952.64 mg/100 g (Kanchan). The EA content was independent of fruit weight and size. There was no correlation between EA content and other factors. The variation in size, weight and EA content among different cultivars may be due to genetical factors (Teaotia *et al.*, 1968). Besides the highest EA content, cv Kanchan also showed highest fruit yield (155 kg tree^{-1}). This was followed by Chakaiya having yield of 47.00 kg. Moreover, Kanchan performs better than other cultivars even under the abnormal weather conditions at fruit setting (Anonymous, 1998). The calculated EA yield was maximum in cv Kanchan and was followed by Chakaiya (207.06 g tree^{-1}). On the basis of higher EA content as well as maximum average yield, the farmers may be encouraged to go for adoption of cv. Kanchan in arid regions.

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