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Determination of Maturity Standards of Aonla (*Emblica officinalis* Gaertn.) Cultivars Under Arid Conditions

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Maturity of fruit is governed by various physical and biochemical aspects undergoing from fruit set to maturity. The storage life and quality of fruits seems to be controlled by the maturity (Roy 1990). Various maturity indices viz., number of days from fruit set, appearance, size, shape, colour, texture specific gravity, soluble solids etc., are used for determining the maturity of fruits. Aonla sets fruits in the month of April-May in arid region and growth of fruit is visible only in August and thereafter growth of fruit starts rapidly. Bajpai and Shukla (1990) reported that best time of harvesting fruits of aonla is February, when fruit has maximum vitamin C content. However, no trustworthy information is available on harvest time of aonla fruits in arid region. Hence, the work was initiated to know the proper maturity stage for harvesting aonla fruits.

The fruiting trees of aonla cv. *Krishna* and *Kanchan* were selected for determination of maturity standards in the year 1990. The branches having uniform number of fruits were tagged during September on all sides of the tree. The experiment was conducted under randomised block design with four replications having a tree as a unit. The trees were kept under the uniform cultural operations through out the experiment. The fruits of uniform size were selected randomly from the marked branches at each date of observations. The physico-chemical properties of fruits were studied at 10 days interval. The physical characters such as weight and size of fruits (Length and diameter) were determined by pan balance and Vernier callipers respectively. Volume of fruits was determined by water displacement method and on the basis of which specific gravity was calculated. Pulp/stone ratio was calculated by weight of pulp and stone separately. The TSS was measured with the help of hand refractometer.

Weight, size, specific gravity and TSS of fruit increased upto 2nd week of December and thereafter decreased gradually (Table 1). The fruit length increased significantly upto 13th December in cv. *Krishna,* while it increased upto 23rd December in *Kanchan.* Later on, increase in length almost stopped in both cultivars. The diameter of fruit appreciably increased upto 23rd and 13th December in *Krishna* and *Kanchan* respectively. Fruit weight and pulp stone ratio also steadily increased upto 13th December in both the cultivars and thereafter the increase in these parameters were found to be non significant. The increased growth of fruit in terms of weight and size is due to enlargment of mesocarp cells and increase in stone weight is due to enlargment of endocarp cells (Bajpai 1968). The size and weight of fruit of *Krishna* and *Kanchan* differed due to genetical character of varieties (Teaotia *et al.* 1968, Singh *et al.* 1989). It was also observed that colour of fruits turned from green to greenish yellow at this time. There was a sharp increase in specific gravity of fruits upto 3rd December in both the cultivars and further it was gradually decreased as the maturity period advanced. The least specific gravity was observed on 23rd December, i.e., 1.8 and 1.4 for *Krishna* and *Kanchan* respectively. Garg *et al.* (1977) also reported that there was a gradual and steady fall in specific gravity of bael fruit as the maturity period advanced.

The total soluble solids (TSS) were low in the immature fruits. These increased as the fruit approached to the final stage of maturity. The TSS increased upto Decmeber in both the cultivars. This may occur because of conversion of starch to sugar as maturity advanced. The increase in TSS of aonla fruits toward maturity has also been reported by Prasad *et al.* (1983) and Singh *et al.* (1989). The TSS content of *Kanchan* fruits was more than *Krishna.*

Table 1 *Physio-chemical changes in aonla fruits cv. Krishna (a) and Kanchan (b) on different dates.*

Date of observation	Length (cm)		Diameter (cm)		Weight (g)		Specific gravity		Pulp/stone ratio		TSS (%)	
	a	b	a	b	a	b	a	b	a	b	a	b
4.11.90	3.3	2.5	3.5	2.8	28.8	13.0	1.1	1.1	10.8	8.4	10.2	11.2
14.11.90	3.4	2.6	3.8	3.0	31.0	14.0	1.2	1.2	11.9	9.1	12.6	13.4
24.11.90	3.5	2.7	3.9	3.1	31.4	16.4	1.4	1.3	12.3	10.2	12.8	14.2
3.12.90	3.7	2.9	4.1	3.4	33.9	19.2	2.0	1.5	14.3	10.7	13.0	14.5
13.12.90	3.8	3.0	4.2	3.7	35.3	20.4	1.9	1.5	14.8	13.9	13.2	15.4
23.12.90	3.8	3.1	4.2	3.7	35.4	20.5	1.8	1.4	14.9	13.9	13.3	15.5
F test	**	**	**	**	**	**	**	**	**	**	**	**
CD (0.01)	0.05	0.03	0.03	0.05	0.42	0.21	0.02	0.03	0.05	0.04	0.01	0.008

** significant at 1%

The maturity standards were determined by the physico-chemical changes in fruits. The colour changes from greenish to greenish yellow and size and weight of fruits attain its maximum at maturity and likewise pulp stone ratio also, while the specific gravity decreased. At the ripening, fruits contain maximum sugar and minimum acids, due to which TSS reached to maximum. Thus, the parameters under study have reached to the maximum and almost remain constant at maturity stage. Therefore, it can be concluded that the optimum time for harvesting aonla fruits is the last week of December onwards.

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