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## MORPHOLOGICAL STUDIES OF UNDERUTILIZED FRUITS

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### ABSTRACT

The morphological study of five selected minor fruit viz. aonla (NA-6 and NA-7), bael (NB-5 and NB-9), ber (Karaka and Umran), jackfruit (NJ-2 and NJ-3) and kaitha (K-1 and K-2) carried out in NDU&T Kumarganj Ayodhya. The present study further indicated that variation in shape, colour and pulp colour of minor fruit germplasms were showed from oval to round (fruit shape), light green with yellowish (fruit colour) and whitish to greenish (pulp colour) in aonla, oblong to globose (fruit shape), brownish to yellowish (fruit colour) and yellowish (pulp colour) in bael, oval to round (fruit shape), greenish yellow to yellow (fruit colour) and whitish to yellowish crispy (pulp colour) in Ber, round to oval (fruit shape), grayish to white (fruit colour) and brownish, mealy (pulp colour) in kaitha and oblong (fruit shape), greenish brown (fruit colour) and bright, yellow (pulp colour) in jackfruit.

**Keywords :** Colour, Flesh Colour, Shape and Underutilized fruits

### INTRODUCTION

Underutilized fruit crops refer to those fruits which may be high in value but that are not widely grown. They are nutritionally important but rarely used by human. People are not aware of its nutritional importance. In a general sense, these fruits are consumable by in relatively less quantity may be due to less palatable or less availability than other fruits (Tripathi *et al.*, 2015). The fruit crops mango, apple, banana, guava, grape, pineapple, papaya, citrus, sapota and litchi grown in India for commercial purpose consist greater than 75 per cent of total area which is under fruit cultivation (Mitra *et al.*, 2004). India is centre of origin of jack fruit, bael, aonla, ber and several other wild fruits (Arora, 1985; Arora, 1998 and Singh *et al.*, 2009). India is the second largest producer of fruits in the world nearly covers 6.36 million hectares of area with a total production of over 88.82 million metric tonnes with productivity of 13.97 tonnes/ha. Uttar Pradesh is grown on 0.46 million hectares with production of 8.54 million metric tonnes, under fruit crops ranks first in terms of area, but production-wise it ranks third (Horticultural Statistics At a Glance, 2015-16). The polar and transverse diameter of Bael fruit varied from 6.65 to 17.78 cm. and 8.52 to 16.82 cm respectively and the external colour of Bael fruit varied from greenish to yellowish shades and yellow to orange colour of bael fruit was found to be not due to carotene but that might be due to some flavanoid pigments (Roy and Singh, 1978). The physico-chemical characteristics of forty seven ber cultivars and observed that the fruit

weight (29.8 g) was highest in Umran and fruit length varied from 2.0 cm to 5.4 cm. (Kaushik *et al.*, 2000). The physico-chemical characters of aonla (*Embllica officinalis*) cultivars, i.e. Banarasi, Chakaiya, Francis, Kanchan, Krishna, NA-6, NA-7 and NA-10, harvested at full maturity. NA-7 was recorded the highest average fruit diameter (Singh *et al.*, 2003). Physicochemical analysis of wood apple revealed that the average fruit weight ranged from 140.08 to 256.65 g, fruit length and width from 6.50 to 8.40 cm and 6.16 to 7.43 cm respectively, volume of fruit from 81.66 to 248.50 cc, specific gravity from 1.04 to 1.74, shell thickness from 0.30 to 0.20 mm and pulp weight from 60.33 to 176.00 g, number of seeds per fruit from 260.50 to 471.66, seed weight per fruit from 8.83 to 15.66 g, seed weight percentages from 8.24 to 13.96%, pulp weight percentage from 86.04 to 91.76 and pulps seed ratio from 7.60:1 to 12.30:1 (Pandey *et al.*, 2013).

### MATERIALS AND METHODS

The present investigation was carried out at laboratory of Department of Biochemistry, Acharya Narendra Deva University of Agriculture and Technology Narendra Nagar Kumarganj Ayodhya (U.P.) India, conducted during 2013-14 and 2014-15. The five underutilized fruit germplasms/varieties namely Aonla (NA<sub>6</sub> and NA<sub>7</sub>), Bael (NB<sub>5</sub> and NB<sub>9</sub>), Ber (Karaka and Umran), Jackfruit (NJ<sub>2</sub> and NJ<sub>3</sub>) and Kaitha (K<sub>1</sub> and K<sub>2</sub>) which had been collected from Horticulture Nursery. The samples from each fruit used to studies on morphological variability of the underutilized fruits.

### 1. Shape of fruits:

Five fruits from each varieties aonla (NA-6 and NA-7), bael (NB-5 and NB-9), ber (Karaka and Umran), jackfruit (NJ-2 and NJ-3) and kaitha (K-1 and K-2) were randomly selected for the measurement of fruit-shape. The shapes of these fruits were measured with the help of vernier callipers scale.

### 2. Colour of fruits:

The colour of fruit was recorded by visual observation by selecting five fruits randomly from each variety.

### 3. Colour of Flesh/Pulp:

The colour of flesh was recorded by visual observation by selecting five fruits randomly from each variety.

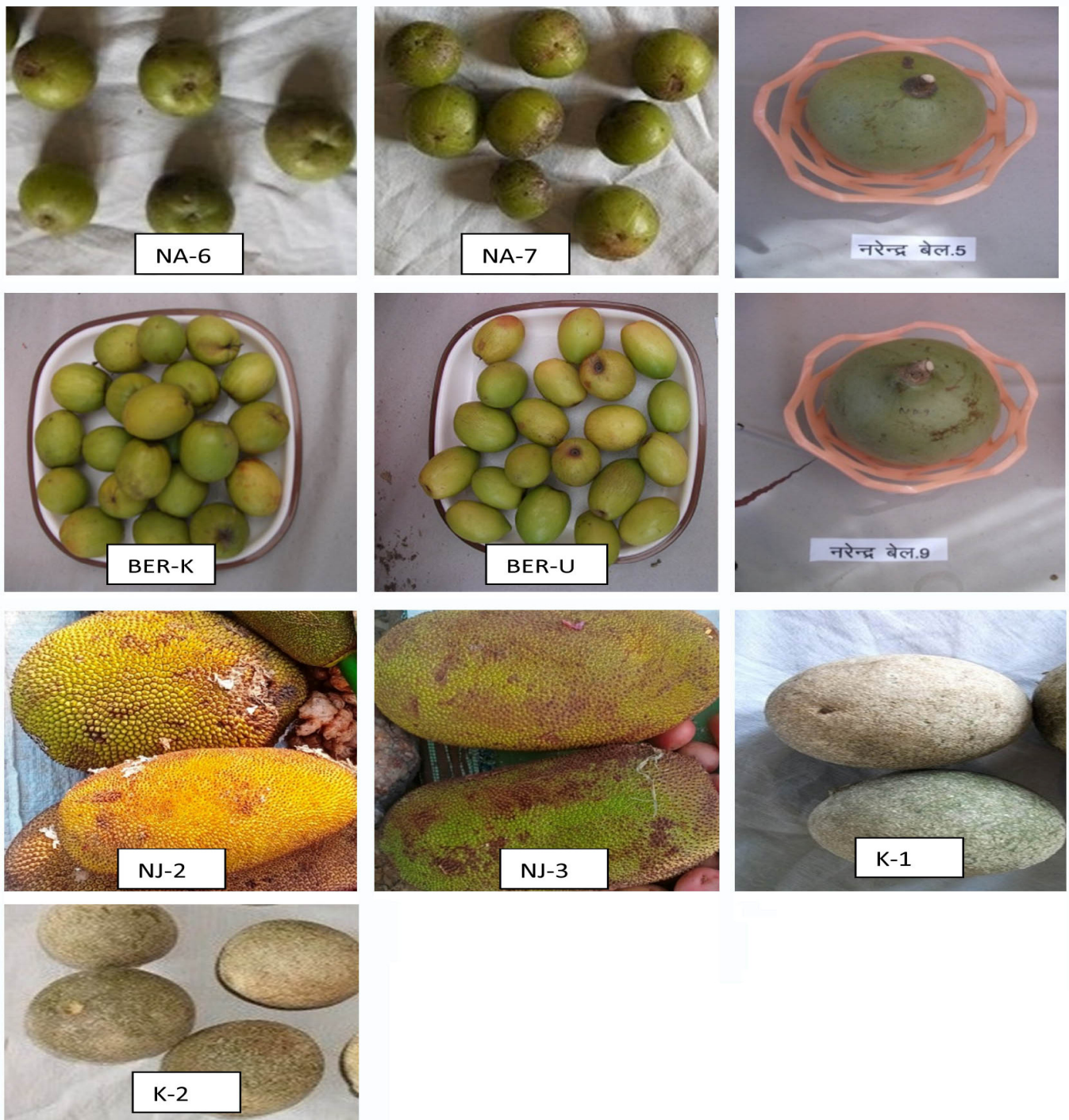
## RESULTS AND DISCUSSION

It can be inferred from the table that the shape, colour and pulp colour of NA-6 and NA-7 was found oval to round (fruit shape), light green with yellowish (fruit colour) and whitish to greenish (pulp colour), NB-5 and NB-9 were found oblong to globose (fruit shape), brownish to yellowish (fruit colour) and yellowish (pulp colour). Ber-K and Ber-U were observed that oval to round (fruit shape), greenish yellow to yellow (fruit colour) and whitish to yellowish crispy (pulp colour). The shape, colour and pulp colour of K-

1 and K-2 were showed that round to oval (fruit shape), grayish to white (fruit colour) and brownish, mealy (pulp colour). NJ-2 and NJ-3 were showed that oblong (fruit shape), greenish brown (fruit colour) and bright, yellow (pulp colour) during 2013-14 and similar result were showed in 2014-15. Similar results were witnessed by Venudevan and Srimathi (2013) in bael (*Aegle marmelos* L.) fruits were categorized based on the colour into three different groups as green, greenish yellow and yellow. Kenghe and Potdar (2009) found in bael fruit that fruit shape varied from flat, spherical, pear and near cylindrical in bail fruits. Yadav *et al.* (2005) also supported in ten *Zyziphus Mauritiana* cultivars, most of the mature fruits were light green, although yellowish green and dark green to green mature fruits were also observed. Ripe fruits were chocolate brown, golden yellow or greenish yellow to yellow. Bhosale *et al.* (2006) observed the fruit colour varied with the cultivar NA-7 appeared to be promising for most of the chemical parameters. Randhawa and Biswas (1966) reported that fruit shape in cultivar Umran was large, elliptical with golden yellow colour having round base and apex. Pandey *et al.* (2013) also reported that the fruit of kaitha was a hard-shelled many seeded berry with its pinkish brown. Goswami *et al.* (2011) found that the pulp colour of two jackfruit cultivar. Khaja fruits were whitish yellow whereas that of Ghila pulps were deep yellow.

**Table 1 :** Shape, Colour and Flesh Colour of underutilized fruit germplasms.

Germplasms	2013-14			2014-15		
	Shape of fruit	Colour of fruit	Flesh/pulp Colour of fruit	Shape of fruit	Colour of Fruit	Flesh/pulp Colour of fruit
NA-6	Oval To Round	Light Green With Yellowish	Whitish To Greenish	Oval To Round	Light Green With Yellowish	Whitish To Greenish
NA-7	Oval To Round	Light Green With Yellowish	Whitish To Green	Oval To Round	Light Green With Yellowish	Whitish To Green
NB-5	Oblong To Globose	Brownish To Yellowish	Yellowish	Oblong To Globose	Brownish To Yellowish	Yellowish
NB-9	Oblong To Globose	Yellowish To Brownish	Yellowish	Oblong To Globose	Yellowish To Brownish	Yellowish
BER-K	Oval To Round	Greenish Yellow To Yellow	Whitish To Yellowish, Crispy	Oval To Round	Yellowish To Greenish	Whitish To Yellowish, Crispy
BER-U	Oval To Round	Greenish Yellow To Yellow	Whitish To Yellowish, Crispy	Oval To Round	Yellowish To Greenish	Whitish To Yellowish, Crispy
K-1	Round To Oval	Grayish To White	Brownish, Mealy	Round To Oval	Grayish To White	Brownish, Mealy
K-2	Round To Oval	Grayish To White	Brownish, Mealy	Round To Oval	Grayish To White	Brownish, Mealy
NJ-2	Oblong	Greenish Brown	Bright, Yellow	Oblong	Greenish Brown	Bright, Yellow
NJ-3	Oblong	Greenish Brown	Bright, Yellow	Oblong	Greenish Brown	Bright, Yellow



**Fig. 1 :** Morphological features of Underutilized fruits

### CONCLUSION

Variation in shape, colour and pulp colour of minor fruit germplasms were showed from oval to round (fruit shape), light green with yellowish (fruit colour) and whitish to greenish (pulp colour) in Aonla, oblong to globose (fruit shape), brownish to yellowish (fruit colour) and yellowish (pulp colour) in Bael, oval to round (fruit shape), greenish yellow to yellow (fruit colour) and whitish to yellowish crispy (pulp colour) in Ber, round to oval (fruit shape), grayish to white (fruit colour) and brownish, mealy (pulp colour) in Kaitha and oblong (fruit shape), greenish brown (fruit colour) and bright, yellow (pulp colour) in Jackfruit.

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