Short communication

Morphological diversity with respect to fruit characters of avocado (*Persea americana* Mill.) in high ranges of Kerala

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Abstract

A study was conducted in the Department of Fruit Science, College of Horticulture, Vellanikkara during 2018-2019 to characterize the accessions of avocado maintained at Regional Agricultural Research Station, Ambalavayal. Twenty-five trees were selected and studied for different fruit and seed characters based on the IPGRI crop descriptor for *Persea* spp. Wide variability was observed for fruit and seed characters. Various fruit shapes such as clavate, ellipsoid, narrowly obovate, obovate and pyriform were observed. Variability was also observed in seed shape such as base flattened and apex conical, base flattened and apex rounded, broadly ovate, cordiform and ovate. Highest fruit weight was recorded in AV-7 (152.7g) and highest seed weight in AV-17 (100.1g).

Key words:Avocado, Characterization, Fruit, Morphology, Seed.

Avocado (*Persea americana* Mill.) commonly known as butter fruit, is a subtropical fruit tree belonging to family Lauraceae. Avocado is well known for its nutritional and therapeutic properties. It is one of the choicest salad fruits in the world owing to its high nutritional quality and buttery flavour. The pulp of avocado is rich in fat (upto 30%) and protein (up to 4%), but low in carbohydrates. It has high energy value of 245 cal per 100g and it is also a reservoir of vitamins and minerals. It is considered an ideal fruit for weight loss as it is a source of healthy fats of plant origin, making its demand even higher. In India, avocado is cultivated only in a few pockets of Karnataka, Kerala, Tamil Nadu and Sikkim and was introduced from Sri Lanka. The crop has found a place in many homestead gardens across Kerala especially in the high ranges of Idukki and Wayanad, and there is ample scope for large scale commercialization in these areas (Pradeepkumar et al*.,* 2001). Avocado is regarded as one of the potential future crops of Kerala and as an ideal fruit for nutritional security. However, there are no identified varieties or local selections of avocado suited to the agro-climatic regions of Kerala. Assessment of morphological diversity can help in understanding the genetic diversity prevailing in the state and will further aid in crop improvement. In this context, the present study was undertaken in the year 2018-19, with the objective to study the morphological variation of avocado fruits, among different accessions of avocado maintained at Regional Agricultural Research Station, Ambalavayal, in Wayanad district. Twenty five steady bearing trees (AV-1 to AV-25) were selected from the accessions maintained in the station for evaluating their morphological diversity. Five mature fruits were collected from each selected tree and the fruit and seed characters were noted based on the IPGRI crop descriptor for avocado (*Persea* spp) (IPGRI,1995). Fruit characters such as fruit weight, fruit length, fruit diameter, fruit base shape, fruit apex shape, fruit apex position, ridges

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on fruit, pedicel position on fruit, fruit skin colour and colour of flesh next to seed were recorded. Seed characters recorded were seed weight, seed length, seed diameter, seed shape, cotyledon colour, cotyledon surface and free space of the seed cavity. Observations on mature fruits collected from the tree were recorded after ripening at room temperature. Based on observations taken from five fruits, each character was recorded. In the case of quantitative characters, each observation was recorded for five individual fruits and the mean value was calculated. Variability was observed within the accessions for both fruit and seed characters (Table 1).

Weight of the fruit ranged from 152.42 g in AV-7 to 434.22 g in AV-17 with mean average weight of 282 g. Fruit length varied from 7.68 cm in AV-15 to 14.66 cm in AV-2 and fruit diameter ranged from 5.30 cm in AV-21 to 8.42 cm in AV-18. Five different fruit shapes, viz., clavate, ellipsoid, narrowly obovate, obovate and pyriform were identified among the accessions. Out of the 25 accessions, 30.40 per cent had fruits of narrowly obovate shape and 17.40 per cent each had clavate and pyriform shaped fruits, while 13 per cent of the accessions had obovate fruits and 4.30 per cent each of accessions had elliptic fruits. Both pyriform and narrowly obovate shaped fruits were found in 4.30 per cent of the accessions.

Fruit base shape was observed as depressed in 73.90 per cent of the accessions and inflated in 26.10 of the accessions. Fruit apex shape was flattened in 30.40 per cent of the accessions and round in 69.60 per cent of the accessions. Fruit apex position was central in 52.20 per cent of the accessions, while asymmetric in 47.80 per cent accessions. In

Table 1. Quantitative traits of avocado fruits and seeds

Accession	Fruit weight (g)	Fruit length (cm)	Fruit diameter(cm)	Seed weight (g)	Length of seed (cm)	Diameter of seed (cm)
AV-1	250.86	8.24	5.78	41.92	3.40	3.72
AV-2	407.18	14.66	7.46	32.90	5.50	2.60
AV-3	186.38	8.72	5.72	41.30	3.65	3.52
AV-4	188.99	7.84	8.14	27.60	4.17	3.59
AV-5	212.72	8.90	6.94	53.70	4.15	3.78
AV-6	191.80	9.70	5.50	26.20	5.05	2.37
AV-7	152.42	7.96	5.72	27.60	4.14	3.21
AV-8	387.82	10.98	7.90	70.40	4.58	5.49
AV-9	388.32	10.66	7.84	69.13	5.57	5.82
AV-10	270.05	9.20	6.52	58.87	4.95	4.55
AV-11	288.24	9.42	7.76	44.75	4.96	4.56
AV-12	239.62	12.50	6.02	38.14	3.62	3.42
AV-13	364.92	9.44	7.58	72.36	4.33	5.36
AV-14	281.06	9.96	6.64	29.40	4.33	3.59
AV-15	178.64	7.68	7.18	40.27	4.22	4.50
AV-16	315.07	10.38	5.98	63.05	5.05	5.22
AV-17	434.22	9.66	8.28	100.10	5.31	5.58
AV-18	391.76	9.70	8.42	87.63	4.81	5.16
AV-20	231.70	11.58	6.40	30.80	4.74	3.75
AV-21	170.96	9.50	5.30	31.50	3.80	2.77
AV-23	408.26	12.62	7.42	40.60	4.40	3.91
AV-24	276.94	9.74	6.60	62.45	5.17	4.82
AV-25	266.98	8.88	6.54	39.40	4.50	4.37
Average	282.00	9.91	6.85	49.13	4.53	4.15
SE	18.50	0.35	0.20	4.27	0.12	0.20
SD	88.80	1.68	0.96	20.46	0.61	0.99
CV	31.50	16.94	14.02	41.64	13.36	23.86

majority of accessions (91.30 %), no ridges were present on fruit surface while 8.70 per cent of the accessions possessed fruits with ridges on the surface. Pedicel was located asymmetrically in 56.50 per cent of the accessions and centrally in 43.50 per cent of the accessions.

Light green skinned fruits were found in 13 per cent of the accessions whereas purple skinned fruits were found in 87 per cent of the accessions. Colour of pulp next to seed was either light yellow (65.20 %) or yellow (34.80 %).

Seed weight was observed to be highest in AV-17 (100.1g) and lowest in AV-6 (26.2 g). Seed length varied from 3.40 cm in AV-1 to 5.57 cm in AV-9 and seed diameter varied from 2.37 cm in AV-6 to 5.82 cm in AV-9. Variability was also observed in seed shape with 34.80 per cent of the accessions with base flattened and apex conical, 26.10 per cent with base flattened and apex rounded, 17.40 per cent broadly ovate, 13 per cent cordiform and 8.70 per cent ovate. Cotyledon surface was identified to be smooth (47.8 %), intermediate (34.8 %) and rough (17.4 %). Cotyledon colour was cream in 39.10 per cent of the accessions, yellow in 34.80 per cent of the accessions and ivory in 26.1 per cent of the accessions. Free space of the seed cavity was found on seed apex in 13 per cent of the accessions and on seed base in 8.70 per cent of the accessions, whereas 78.30 per cent of the accessions had no free space in seed cavity.

Avocado belongs to three horticultural races, West Indian, Guatemalan and Mexican, and wide variability exists among these races (Scora et al., 2002). The observations on morphological traits of avocado fruit and seed recorded from the study were found to be similar to the findings from the study by Gomez-Lopez (2000), Nkansah et al. (2013) and Abraham et al. (2018). The results indicated wide variability in the morphological characters of fruit and seed, indicating the existence of large germplasm in avocado, which in turn would help to develop varieties with good yield and quality.The development of avocado varieties with good export quality could ultimately lead to its large scale cultivation in Kerala.

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