



Comparison of physical characteristics of avocado cultivars grown in Kerala

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Abstract

Avocado or butter fruit is a tropical evergreen climacteric fruit scientifically known as *Persea americana*, which belongs to the family Lauraceae. Avocado is a medium-sized, evergreen tree that reaches about 20-30 feet in height with large, green foliage cover. The fruits were pear-shaped and green in color. The present study is focussing on the physical characteristics of the Avocado cultivars, which were grown in Kerala. The cultivars selected for the study include Purple hybrid, Fuerte, Kallar round and Pollock. The parameters analysed included the fruit side, shape, weight, fruit length, seed length, cavity width and cavity length. Pollock had shown the highest fruit length (17.00cm), fruit weight (435.20g), seed length (7.20cm), skin waste (35.93g) and seed weight (50.37g). The highest skin thickness (0.17cm) and cavity length (7.50cm) was noted in Purple hybrid. The pulp yield (86.20g) was found higher in the cv Kallar round.

Keywords: seed length, seed shape, cavity length, cavity width, pulp yield ratio

Introduction

Fruits are nature's marvelous gift to humankind; indeed, they are life-enhancing medicines packed with vitamins, minerals, antioxidants, and many phytonutrients. They are an absolute feast to our sight, not just because of their color and flavor but of their unique nutrient profile that helps the human body be fit, rejuvenate and free of diseases. Avocado is a medium-sized, evergreen tree that reaches about 20-30 feet in height with large, green foliage cover. It prefers fertile soil with high temperatures and moisture to flourish. Small light green flowers appear during winter. After about 8-10 month time from bloom, hundreds of pear-shaped green fruits cover all over the tree.

In Kerala, it is found grown in homesteads of Wayanad and Idukki Districts. Different varieties of avocados are propagated and distributed to farmers by Regional Agricultural Research Station, Kerala Agricultural University Ambalavayal, Wayanad. The cultivars grown in Ambalavayal are Pollock, Kallar round, Purple Hybrid and Fuerte. (The Hindu, 2010). The three horticultural races adapted for tropical and subtropical regions were West Indian, Guatemalan and Mexican. The cultivars of West Indian race are grown in localized pockets in Maharashtra, Tamil Nadu, and Karnataka. Both the Mexican and Guatemalan races are successfully grown in Sikkim. The present study is a comparison of the physical characteristics of avocado cultivars grown in Kerala.

Materials and Methods

Four avocado cultivars that were grown in Wayanad District of Kerala State were selected for the study. The cultivars selected were Pollock, Kallar round, Purple hybrid, and Fuerte. The mature fruits were collected from Regional Agricultural Research Station, Ambalavayal, Wayanad

District. Ripe fruits were collected and used to measure the physical characteristics:- The physical quality attributes of four avocado cultivars selected in this study were analyzed to learn the morphological characteristics which in turn could help in identification of the suitable varieties. The major physical characters assessed on ripe fruits were fruit weight, fruit length, skin thickness, cavity width, cavity length, skin waste, seed shape, seed weight, seed length, fruit shape, and pulp weight. Length of fruit, fruit thickness, and cavity width and cavity length were measured using thread and a measuring scale and expressed in centimeters. Weight, skin waste, seed weight, and pulp weight were measured using standard weighing balance. Skin thickness was measured using digital Vernier Calipers.

Statistical Analysis

To obtain suitable interpretation, the generated data was subjected to statistical analysis using One-way Analysis of Variance (ANOVA) at a 5% level.

Results and Discussion

The major physical characteristics assessed for the study were the fruit shape, length, weight, seed weight, seed shape, cavity width, cavity length, skin thickness, skin waste, pulp yield ratio, seed length. The geographical differences, in the cultivars, made diversity in the physical characteristics of the cultivars. Moreover, results obtained for the same variety from the same orchard change between harvest seasons and in the same season because of differences in climatic conditions and harvest time through the season (USDA, 2009) [10]. The major physical characteristics assessed for the study were fruit shape, length, weight, seed weight, seed length, cavity width, and cavity length

Table 1: Assessment of physical characteristics of different avocado cultivars

Cultivars	Fruit length(cm)	Fruit weight(g)	Seed weight(g)	Seed length(cm)	Shape
Pollock	17.00 ^a	435.20 ^a	50.37 ^a	7.20 ^a	Obovate
Kallar Round	10.54 ^d	183.64 ^d	22.10 ^d	4.50 ^c	Narrowly Obovate
Purple Hybrid	15.52 ^b	233.04 ^b	34.61 ^c	5.50 ^b	Pyriform
Fuerte	14.70 ^c	202.52 ^c	38.19 ^b	4.60 ^c	Clavate
CD (0.05)	0.193*	31.509*	0.817*	0.240*	

(Values indicated are mean values of four replicates). *Significant @ 5 %

Fruit length

While considering the four avocado cultivars, the fruit length was found high in the cultivar Pollock (17.00cm), and the lowest fruit length was noted in Kallar round (10.54 cm). The values found significant at 5% level and showed significant difference between the cultivars. The cultivar Fuerte was 7cm-20cm long based on the study conducted by FAO (2002) [4].

Fruit weight

Fruit weight of the four avocado cultivars were analysed and the cultivar Pollock showed the highest fruit weight (435.20g), whereas the lowest fruit weight was recorded in kallar round (183.64g). Whiley (2000) reported that avocado pear varies in weight depending on the cultivar and he also added that the fruit weight of the cultivar pollock ranges from 350g to 630gm.

Seed weight

The data obtained for seed weight shows that the seed weight was low in the cultivar Kallar round (22.10g). The highest seed weight was observed in the cultivar Pollock (50.37g). In the remaining cultivars, the seed weight was 38.19g in Fuerte and 34.61g in Purple hybrid. The seed weight of the cultivar Fuerte and Pinkerton ranges from 20g to 55g based on the size of the fruit (USDA, 2011) [11].

Seed Length

Observations on the seed length indicate that the lowest seed length was noted in the cultivar Kallar round (4.50cm) and on par with Fuerte (4.60 cm)).The highest seed length was observed in the cultivar Pollock (7.20cm).According to the study conducted Taah (2003) reported that the seed length of the West Indian race of avocados ranges from 5cm to 15cm.

Fruit shape

While analyzing, the fruit shape different avocado cultivars, Pollock showed obovate shape, kallar round was narrowly obovate, the Purple hybrid was pyriform, and Fuerte showed clavate shape. The study conducted by Thripati and Karunakaran (2013) revealed that the shape of the fruit Pollock ranges from obovate to narrowly obovate.

Seed shape

The seed shape of the different avocado cultivars were assessed and the cultivar Pollock showed pyriform shaped seeds. Kallar round exhibited round shaped seeds, whereas the Purple cultivar hybrid showed oblong seeds, and the cultivar Fuerte showed obovate shaped seeds. The seed shape of the cultivar Reed and Fuerte was obovate (Chia *et al.*, 2010) [2].

Table 2

Cultivar	Seed shape	Cavity width (cm)	Cavity length(cm)	Skin thickness (cm)	Skin waste(g)	Pulp yield ratio (%)
Pollock	Pyriform	4.50 ^a	6.50 ^b	0.15 ^b	35.39 ^a	86.20 ^a
Kallar round	Round	4.30 ^b	4.00 ^d	0.08 ^d	14.74 ^d	75.40 ^b
Purple hybrid	Oblong	3.50 ^d	7.50 ^a	0.17 ^a	24.62 ^c	75.11 ^c
Fuerte	Obovate	4.00 ^c	6.00 ^c	0.12 ^c	27.80 ^b	71.30 ^d
CD (0.05)	-	0.216*	0.213*	0.012*	0.777*	0.249*

(Values indicated are mean values of four replicates). *Significant @ 5 %

Cavity width

On interpreting the cavity width of four different avocado cultivars, it was observed that the cultivar Pollock (4.50cm) recorded the highest cavity width, and the lowest cavity width was noted in the cultivar purple hybrid (3.50 cm). The cavity width of Guatemalan avocados ranges from 0.5cm to 5cm (Corral *et al.*, 2008) [3].

Cavity Length

The higher cavity length among the cultivars was noted in the cultivar Purple hybrid (7.50cm), and the lowest cavity length was noted in Kallar round (4cm). Statistical analysis high lightened that the cavity length showed significant difference between the cultivars. Pamplona Roger (2007) opined that the cavity length of avocados depends on the races they belong, and the cavity length of the Guatemalan race ranged from 5cm to 7 cm.

Skin thickness

The lowest skin thickness was noted in the cultivar Kallar round (0.08cm), and the highest skin thickness was noted the Purple cultivar hybrid (0.17cm), and the skin thickness was found significant at 5% level. Arias and Gomez (2012) reported that the skin thickness of the cultivars Pinkerton and Zutano varies between 0.02 to 1 cm.

Skin Waste

On comparing the skin waste, the highest amount of skin waste was noted in the cultivar Pollock (35.95g), whereas the lowest skin waste was noted in the cultivar Kallar round (14.74g). The comparison found significant at 5% level. Scora (2002) reported that avocado fruits were covered with skin ranging between 1.5cm to 2cm and skin waste constituted around 20% of the total weight of the fruit.

Pulp yield ratio

On ascertaining the Pulp Yield Ratio of the selected cultivars the highest amount of pulp yield was noted in the cultivar Pollock (86.20%), and the lowest pulp yield ratio was noted in the cultivar Fuerte (71.30%). The pulp yield of the cultivars varies with 79% to 90.2% based on the study conducted by Golukcu (2010) [5].

Conclusion

In the present study, Pollock had shown the highest fruit length (17.00cm), fruit weight (435.20g), seed length (7.20cm), skin waste (35.93g) and seed weight (50.37g). The highest skin thickness (0.17cm) and cavity length (7.50cm) was noted in Purple hybrid. The pulp yield (86.20g) was found higher in the cv. Kallar round. From the above observations on physical characteristics of the selected avocado cultivars, it could be stated that Pollock revealed to be the excellent cultivar for its relative merit concerning edible portion, fruit weight, and fruit length.

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