

Evaluation on Sensory Characteristics and Qualitative Analysis of Ten Cultivars of Mango

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Abstract

Ten mango cultivars which are commonly found Myanmar were selected for the study. Ten cultivars of mango: Yin Kwe, Seintalone, Padamyar ngamaut, Panswe, Thamidaw, Shwehinthar, Myakyauk, Nandawhmine, Machitsu and Yarzamat were purchased from Thirimingalar market, Yangon Region for sensory evaluation and fruit quality test. The result of sensory evaluation and qualitative character of varieties showed that Seintalone mango possessed higher (17.97° Brix), moderate acidity (0.16%), less fiber content (0.50g). The general acceptability of Seintalone was 6.20 cm, the pulp color intensify was 5.83 cm, less Pungent (7.2 cm), higher pulp firmness (5.47 cm). Pleasant aroma (9.20 cm), reduced off-odor (4.6 cm) and off-flavor (5.77 cm) compared to the other varieties. Therefore, Seintalone mango cultivars was found to have high quality and most acceptable from sensory evaluation. Seintalone mango fruit cultivars are complete favorably in the export market.

Keywords: Mango, Sensory character, Qualitative analysis.

Introduction

Mango, *Mangifera indica* L., popularly known as the king of fruit, is an evergreen tree, grown under tropical and subtropical environments around the world. Mango belongs to the family Anacardiaceae. Nearly 200 varieties of mango exist in Myanmar (MAS, 2005). In Myanmar; mangoes are grown mainly in Mandalay, Ayeyarwady, Bago and Yangon division and in Mon state. The Seintalone, Shwehinthar, Myakyauk, Yinkwe and Thankonchar cultivars had the best export potential because of their superior flavor, colour and size.

The top quality Seintalone, Shwehinthar and Yinkwe cultivars are the most popular cultivars sold to china. (Myanmar Agricultural Service, 2005). The best commercial varieties of mango in Myanmar are Seintalone, Shwehinthar, Myakyauk, Bingalar, Nette, Aung Din, Khaung Cho, Machitsu and Yin Kwe, etc. Most of Myanmar mango varieties possess fair to good flavors, less fiber and long shelf life (FAO, 2003). The quality of various mango varieties is judged by their sweetness, fiber content, aroma, flavor, shelf life and seed pulp ratio. Some changes were

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occurred in the same variety due to the climatic and soil characteristics of the respective locality.

The judges randomly tested the colour, flavour, taste and overall acceptability in three mango samples from each variety. The judges were provided with prescribed questionnaires to record their observation. Consumer acceptance is mostly dependant on color of the product (Crisosto *et al.*, 2003) while the perception of sweetness and flavor can even evoke emotional feelings in humans (Bayarri *et al.*, 2001). There are many types of sensory analysis methods, the most popular being difference tests, descriptive analysis and consumer acceptance testing (Lawless & Heymann, 1998).

After knowing sensory characters and qualitative analysis of mango, this study is aimed to conduct to distribute the sensory character and to observe the qualitative character of 10 cultivars of mango and to select the best mango cultivar in the export market.

Materials and Methods

Qualitative characters of ten selected mango cultivars

Ten cultivars of mango fruits: Yinkwe, Seintalone, Padamyangamauk, Panswe, Thamidaw, Shwehinthar, Myakyauk, Nandawhmine, Machitsu and Yarzamat were purchased from Thirimingalar Market in Yangon (Appendix 1). Marketable mangoes based on healthy mangoes at proper stage of maturity and ripeness.

Qualitative analysis of mango

(a). Sample preparation

Three numbers of each of mature, fresh and healthy mangoes were purchased from Thirimingalar local fruit market. The analysis was conducted in the Department of Botany, University of Yangon.

(b). Total soluble solids

Total Soluble Solid (TSS) of juice was determined using hand refractometer and expressed as °Brix.

(c). Titratable Acidity

Titrateable acidity (TA) was measured by titrating the known volume of juice with 0.1 N NaOH. The required amount (milliliters) of NaOH is used to calculate the TA using the formula stated by Dhatt (2007).

(d). Firmness

Firmness can be used to determine the firmness of commodities using penetrometer which measures the pressure necessary to force into the pulp of the fruit by a plunger of specified size.

Sensory evaluation on ten cultivars of mango**(a).Preparation of sensory scoring sheet**

The sensorial evaluation of various mango varieties was performed in the sensory laboratory of the Department of Botany, University of Yangon, using hedonic scale (where 1 = dislike extremely and 9 = like extremely) as described by Lawless and Heyman (2010). Three fruits from each treatment of a variety were randomly selected and sliced it into small pieces. Ten panelists were selected on the basis of their ability to discriminate and scale a broad range of different attributes. The judges were provided with prescribed questionnaires to record their observation.

(b). Data Collection

Fruit weight, sweetness, acidity, pH, fiber content, peel firmness, pulp firmness, were collected and the sensory test was done to judge upon the fruits by the sense of panels. The collected data were statistically analyzed using IRRISTAT software, version 6.2.

Results**Sensory evaluation on ten cultivars of mango**

The statistical results showed that Padamyangamauk had the highest color intensity 7.47 cm, while Machitsu possessed the lowest intensity 2.90 cm. The result of the browning showed that Myakyaut, Yarzamat and Seintalone were the least browning 10.00 cm and 9.80 cm. The highest pulp firmness was observed in Myakyauk 6.40 cm and lowest pulp firmness was observed in Yarzamat 3.67 cm. The results on pungency showed that the highest pungency was obtained from Thamidaw 9.73 cm and that of lowest from Yinkwe 6.2 cm (Table 1).

Table 1. Pulp characteristics of ten mango cultivars

Cultivars	Hedonic Rating for pulp characteristics (cm)			
	Pulp intensity	Pulp browning	Pungent	Pulp Firmness
Yinkwe	5.47	5.63	6.20	4.23
Seintalone	5.83	9.80	7.20	5.47
Padamyangamauk	7.47	9.00	8.40	5.13
Panswe	6.47	8.67	6.60	6.27
Thamidaw	5.53	6.10	9.73	5.03
Shwehinthar	3.27	9.40	6.53	6.07
Myakyauk	3.60	10.00	7.20	6.40
Nandawhmine	5.20	9.20	8.90	3.90
Machitsu	2.90	9.53	8.30	5.10
Yarzamat	5.00	10.00	9.30	3.67
F-test	ns	**	**	ns
5% LSD	3.39	1.25	1.73	2.12
cv%	39	8.1	13.2	24.7

The statistical results showed that the characteristics of mango flavour and odor among ten cultivars were significant at 0.01 % level. The results also showed that Seintalone had the highest aroma 9.20 cm, followed by Padamyangamauk 7.13 cm, then Yinkwe 6.87 cm. Similarly Yinkwe had the highest off-odor 8.90 cm, followed by Yarzamat 8.80cm, then Machitsu 8.67 cm. The highest mango flavour of Yinkwe was 8.50 cm while Yarzamat had 8.33 cm, Thamidaw had 7.79 cm and the lowest in Shwehinthar 6.07 cm. The minimum off-flavour 2.27 cm was resulted from Machitsu whereas the maximum from Yarzamat (Table 2).

Table 2. Characteristics of mango flavour and odor of ten cultivars

Mango Cultivars	Hedonic Rating for Odor and Aroma (cm)			
	Aroma	Off-odor	flavor	Off-flavor
Yinkwe	6.87	8.90	8.50	9.27
Seintalone	9.20	4.60	6.67	5.77
Padamyangamauk	7.13	7.93	7.80	8.63
Panswe	5.97	7.13	6.93	8.97
Thamidaw	5.90	7.10	7.97	9.37
Shwehinthar	5.93	8.60	6.07	7.80
Myakyauk	6.20	8.60	6.23	9.73
Nandawhmine	6.13	7.40	7.40	8.03
Machitsu	6.27	8.67	7.33	2.27
Yarzamat	6.60	8.80	8.33	9.80
F-test	**	**	**	**
5% LSD	1.35	0.87	1.32	1.13
cv%	11.9	6.5	10.4	7.6

In overall quality among 10 cultivars, Seintalone possessed the maximum sweetness 9.90 cm, reduced acidity 6.97 cm, highest general acceptability 6.20 cm and moderate balance of sweetness and sourness 6.20 cm. The balance of sweetness and sourness of Yarzamat was the highest 7.33 cm, the Second highest

from Machitsu 6.23 cm and the third from Seintalone 6.20 cm. Sweetness and sourness were significant at 0.05 % level and balance of sweetness and sourness was 0.01 % level of significance but general acceptability was not significant (Table 3).

Table 3. The characteristic flavor of ten mango cultivars

Cultivars	Hedonic Rating for Flavour (cm)			
	General acceptability	Sweetness	Sourness	Balance of sweetness and sourness
Yinkwe	4.70	6.60	6.49	6.17
Seintalone	6.20	9.90	6.97	6.20
Padamyangamauk	5.70	7.37	8.53	5.60
Panswe	4.73	6.37	7.43	5.93
Thamidaw	5.13	6.27	7.73	5.47
Shwehinthar	4.20	5.20	5.00	5.93
Myakyauk	5.93	5.13	7.53	5.83
Nandawhmine	4.53	5.30	7.73	5.67
Machitsu	4.87	4.30	8.17	6.23
Yarzamat	5.47	7.40	8.23	7.33
F-test	ns	**	**	*
5% LSD	1.66	1.67	1.89	1.45
cv%	19.1	15.4	15.2	14.1

Qualitative characters of ten selected mango cultivars

Weight of fruit, pulp, peel and seed

The fruit weight of Machitsu were 466.67 g and the second largest weight was obtained from Yarzamat 382.50 g. Seintalone was medium weight but bigger 355 g than Padamyangamauk 243.17 g. The biggest pulp weight 136.89 g and peel weight 77.78g were observed in Machitsu. The smallest seed weight was found in Myakyauk 25.87 g. (Table 4).

Table 4. Fruit weight, seed weight, peel weight and pulp weight of ten cultivars

Cultivars	Fruit weight (g)	Pulp weight (g)	Peel weight (g)	Seed weight (g)
Yinkwe	300.75	87.89	50.13	51.13
Seintalone	355.00	104.13	59.17	60.35
Padamyangamauk	243.17	71.33	40.53	41.35
Panswe	201.73	59.17	33.62	34.27
Thamidaw	269.83	79.15	44.98	45.87
Shwehinthar	316.83	92.93	52.80	53.83
Myakyauk	152.17	44.65	25.37	25.87
Nandawhmine	290.83	85.30	48.50	49.43
Machitsu	466.67	136.89	77.78	79.33
Yarzamat	382.50	112.20	63.75	65.03
F-test	**	ns	*	ns
5% LSD	73.19	1.44681	0.95878	0.71420
cv%	14.30	1.00	1.10	0.80

ns = non significant * = significant ** highly significant

The qualitative character of 10 cultivars of mango showed that the total soluble solid (TSS) of Seintalone was the second highest 17.97 °Brix and moderate acidity 0.16 %. The least fiber content was observed in Seintalone 0.50 g. (Table 5).

Table 5. TSS, TA, fiber content, pH, Pulp and Peel firmness from ten mangos cultivars

Cultivars	TSS (°Brix)	TA (%)	Fiber content (g)	pH	Pulp firmness (Kg cm ⁻²)	Peel firmness (Kg cm ⁻²)
Yinkwe	17.40	0.17	2.00	4.00	0.15	1.75
Seintalone	17.97	0.16	0.50	5.00	0.18	2.08
Padamyangamauk	19.93	0.56	0.99	3.00	0.12	1.42
Panswe	16.10	0.43	1.28	4.00	0.12	1.18
Thamidaw	15.43	0.53	1.39	4.00	0.13	1.57
Shwehinthar	12.80	0.30	0.86	3.00	0.16	1.85
Myakyauk	14.00	0.17	4.53	6.50	0.80	0.89
Nandawhmine	17.87	0.17	0.60	5.00	0.14	1.70
Machitsu	11.73	0.17	9.60	3.00	1.24	2.72
Yarzamat	15.20	0.10	2.40	4.00	0.19	2.23
F-test	**	**	*	ns	ns	ns
5% LSD	0.54	0.24	0.00	0.36	0.31000	0.12157
cv%	11.90	51.50	1.00	1.00	12	4.1

** highly significant, * significant, ns = non significant

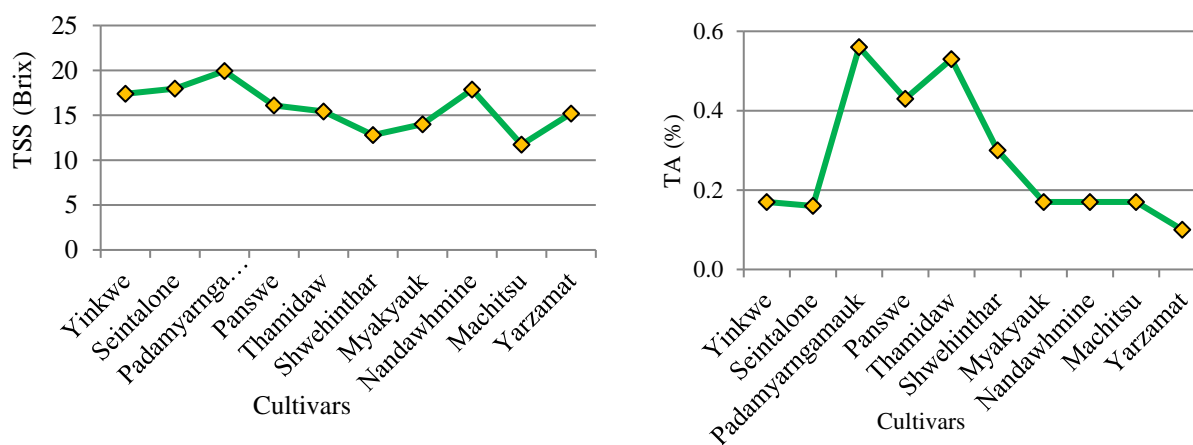


Figure 1. Qualitative character of TSS and TA

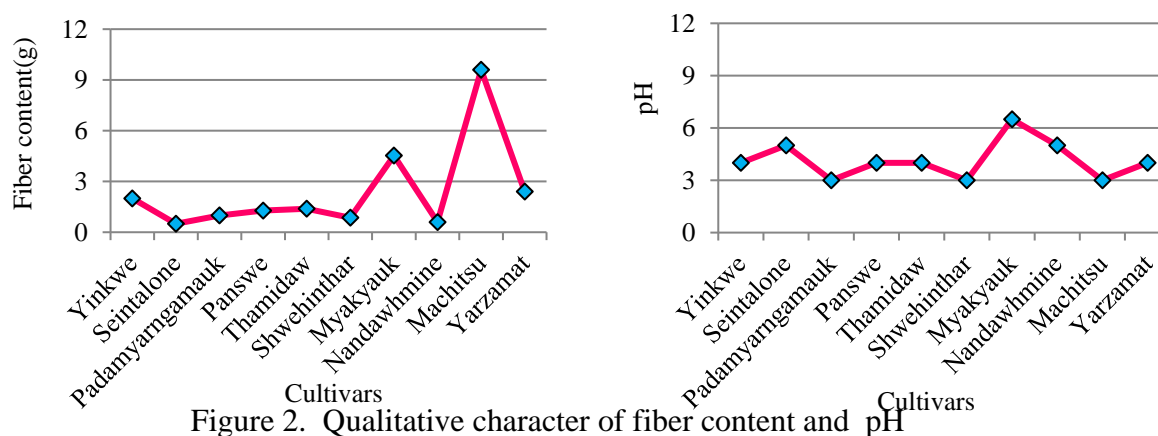


Figure 2. Qualitative character of fiber content and pH

Peel and pulp firmness was measured with penetrometer.

Among 10 cultivars, the highest pulp 1.24 Kg cm⁻² and peel 2.72 Kg cm⁻² firmness were observed in Machitsu. Statistically both peel and pulp firmness was not significant.

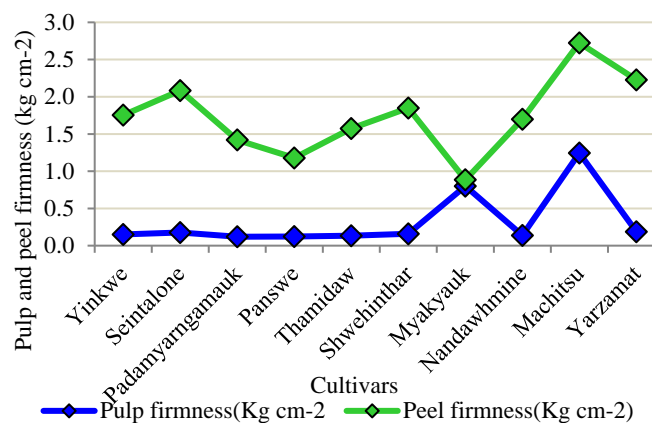


Figure 3. Qualitative character of pulp and peel firmness

Discussion and Conclusion

There are many cultivars of mango with different qualities such as sweetness, aroma, fiber content, etc. The fruit quality is based on the scarcity of fiber, sweetness and minimal turpentine taste. The flash of the imported cultivars is peach-like and juicy of melting texture of more or less free from fibers (Griesbach, 1992). The results of qualitative analysis of mango fruits revealed that the highest sweetness was Padamyangamauk, the second highest while in Seintalone and it possessed the highest Brix when compared with the other 9 varieties. The acid content of Padamyangamauk was highest among others but Seintalone was medium content and its pH also showed less acid range compared to the Padamyangamauk and the others. Machitsu was highest fiber content, followed by Myakyauk, then Yarzamat, Yinkwe. The least fiber content was observed from Seintalone. The fruit weight of Seintalone was medium 355 g but bigger than Padamyangamauk 243.17 g. The thickness of peel is one of the preferable characters of consumers and the thickness of peel could protect the fruits from water loss and any other injury. Bhuyan and Obra (2007) reported the characterization of some uncommon varieties of Bangladesh are undertaken for recording data on the quantitative and qualitative characteristic of fruit.

The main sensory evaluation test for colour, flavour and odour of mango pulp involved consumers recruited through personal communication and their willingness to undertake this research. Each consumer evaluated the sample using nine point hedonic scale method as described by Larmond (1997) where less than 5 cm

represents extremely disliked and 5 cm and above extremely liked. According to the result, the sensory evaluation was made by asking a set of questions to the trained and untrained panelists.

The results of sensory evaluation revealed that the general acceptability of Seintalone was the highest, less pungent, more pulp firmness. It has high aroma, reduced off - odor and off - flavour compared to the other cultivars. It was the sweetest among all and reduced acidity. Owing to the fiber content, sweetness and acidity, pH, pulp and peel thickness, and highest points in sensory evaluation, Seintalone mango fruit cultivars are will complete favorably in the export market.

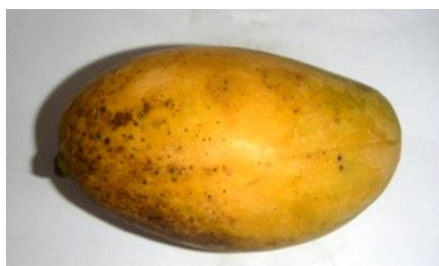
Acknowledgements

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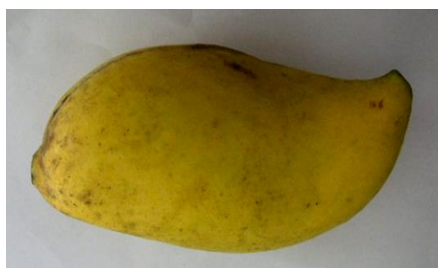
Appendix



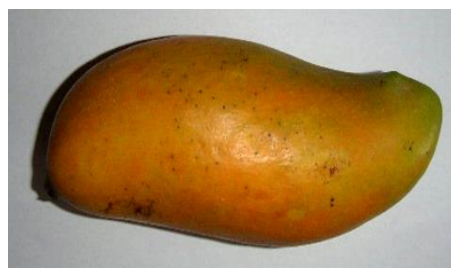
(a) Yinkwe



(b) Seintalone



(c) Shwehinthar



(d) Myakyauk



(e) Panswe



(f) Nandawhming



(h) Yazamat



(g) Padamyar nga mauk



(i) Thamidaw



(j) Machitsu

Appendix Figure 1. Ten varieties of mangoes for sensory evaluation and qualitative analysis

Appendix Table 1. Sensory evaluation sheet for qualitative analysis

SENSORY EVALUATION SHEET FOR TEN VARIETY FRESH MANGO

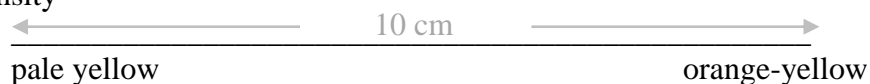
Name : _____

Sample Codes : A, B, C, D, E, F

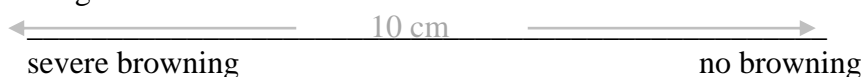
Date : _____

1. Pulp color quality

a. Intensity

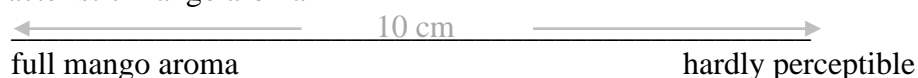


b. Browning

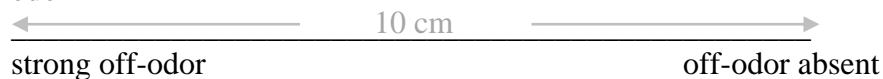


2. Aroma

a. Characteristic mango aroma

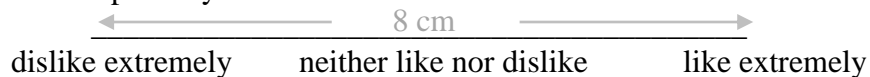


b. Off-odor

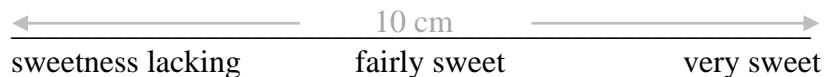


3. Flavour

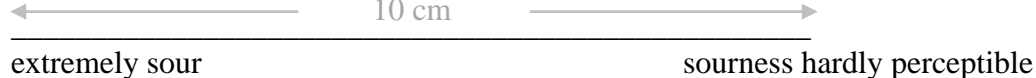
a. General acceptability



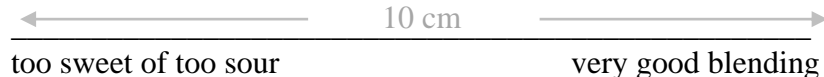
b. Sweetness



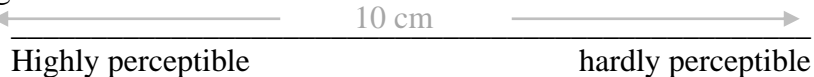
c. Sourness



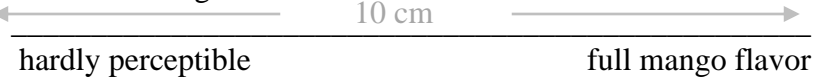
d. Balance of sweetness and sourness



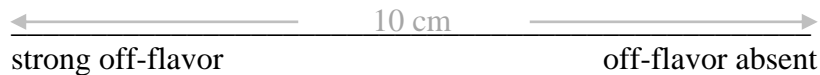
e. Pungent



f. Characteristics mango



g. Off-flavor



4. Pulp Firmness

