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A Study on Physico-Chemical Characteristics of different Lemon varieties of Vijayapur District

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Abstract: ***A study was conducted at Vijayapura district of Karnataka state on the physico chemical characteristics of different varieties of lemon grown in Vijayapur district. The lemons were collected from different talukas named, Muddebihal, Talikoti, Basavana-Bagewadi, Sindgi and Vijayapur. Total 11 parameters were selected to evaluate the quality of the lemon varieties. The fruit shape of 3 villages recorded spherical shape, and 2 recorded hemi-spherical Shape. The rind texture of 3 villages recorded smooth texture, one village recorded semi-smooth and one village recorded rough texture. The maximum fruit diameter of lemon (4.9 cm) was recorded in the Vijayapur and the minimum fruit diameter (3.8 cm) was recorded in the Sindgi. The maximum fruit length of lemon (7 cm) was recorded in the Muddebihal) and the minimum fruit length (4.5cm) was recorded by the Talikoti.The fruit weight of lemon (43.10g) was recorded in the Muddebihal and the minimum fruit weight (30.25g) was recorded by the Sindgi.The maximum core diameter of lemon (0.7 cm) was recorded in the Muddebihal, Basavana-Bagewadi, vijaypur and the minimum core diameter (0.5cm) was recorded in the Sindgi.The maximum rind thickness of lemon (0.30cm) was recorded in the Sindgi. The juice weight of lemon (25 ml) was recorded in the Sindgi.The maximum seed number of lemon(13) was recorded in the Talikoti. The maximum no of articulation of lemon (11) was recorded in the Muddebhihal. The Vitamin C content of lemon (37.5mg/100g) was recorded in the Sindagi. The study concluded that there was a significant variability observed for physico-chemical characters among different varieties of lemon fruits.***

I. INTRODUCTION

The name "lemon" first appeared 1350-1400 from the Middle English word lemon. Limon is an old French word, indicating that the lemon entered England via France. The old French derives from the Italian which dates back to the Arabic or lemon, from the Persian word lemon. Citrus fruits in general contain sugars, polysaccharides, organic acids, lipids, carotenoid (pigment), vitamins, minerals, flavonoids, bitter limuloids and volatile components. The lemon is a good source of potassium (145 mg per 10g fruit), bioflavonoids, and vitamin(40 to 50 mg per 100g, twice as much as oranges). The isolation of vitamin C from lemon juice has been performed, Calcium (61 mg) is also present, along with vitamins A, B1, B2, and B3.The fruit is also low in calories, containing 27 Kcal per 100 g. Other constituents of lemon include volatile oil (2.5% of the peel, limonene, alphapinene, citral, coumarins, mucilage, pectins and bioflavonoids (mostly from pith and peel). Flavonoids eriocitr in and hesperidin have been evaluated. When purchasing supplements for bioflavonoid benefits, note that content varies. Low-cost powdered lemon (and other citrus fruit) peel contains only 1% to 2% flavonoids; however, standardized products contain 10% to 90% flavonoids. Citrus is an excellent source of vitamin C. Most persons can achieve 100% of the RDA for vitamin c by consuming moderate amounts of citrus fruit (Table 3), Vitamin C (ascorbic acid) is a water-soluble essential nutrient Which acts as an antioxidant, is involved in iron metabolism, the biosynthesis of carnitine, neurotransmitters, collagen and in the cross-linking of these fibres in bone, and is a cofactor in various enzymatic and hormonal processes. Vitamin C is also involved in the immune system by stimulating white blood cell function. Vitamin C can help reduce the risk of pre-eclampsia during pregnancy and in some studies vitamin C has been shown to lessen the severity and duration of cold symptoms.

A. Lemon Tree Varieties

Generally, lemon trees are smallish in size and produce lemons throughout the year. The lemon fruit is usually yellow; some varieties (Meyer) are more orange in colour, sour to acidic and most are voval in shape. Lemon trees do not have a dormant phase in the winter and tend to produce flowers throughout the year.

B. Eureka Lemon

The Eureka lemon tree originated as a chance seedling in California, USA. This is probably the most common lemon in suburban Sydney. The fruit is bright yellow with rougher skin than the Meyer and 'Lisbon' varieties. The lemons have high juice content and taste sharply acidic.

C. Lisbon Lemon

The Lisbon lemon tree is a very vigorous variety that can grow to a large size, with upright branches and dense foliage. It originated in Australia and was thought to have been introduced to Australia by the Portuguese. The fruit is smoother than the Eureka with a pronounced nipple at the end and a short neck.

D. Meyer Lemon

The Meyer lemon tree was named after the American plan explorer, Frank Meyer who introduced it from China in 1908. It is considered to be a hybrid between a lemon and a mandarin or an orange. The foliage is similar to lemon but the fruit is more rounded, with light orange-yellow skin.

E. Sweet Lemon

Sweet lemon (botanical name *Citrus limetta risso*) is a term given to non-acidic lemons, or limettas. Native to Southeast Asia, it is grown in the Mediterranean and in India, and are used in local cuisine.

F. Organic Lemon

Organic lemons are grown without chemical pesticides.

G. Ponderosa Lemon

The bumpy Ponderosa lemon (botanical name limon x media), looks like a relative of the ugli fruit and just about as large (the lemon in this photo is 6 inches), is not a true lemon, and is more cold sensitive than true lemons.

There are various benefits of Lemon like being a citrus fruit, fights against infection. It help in production of white Blood cells and antibodies in blood which attacks the invading microorganism and prevents infection. Lemon is an antioxidant which deactivates the free radicals preventing many dangerous diseases like stroke, cardiovascular diseases and cancers. Lemon lower blood pressure and increases the levels of HDL (good cholesterol) Lemon is found to be anti-carcinogenic which lowers the rates of colon, prostate and breast cancer.

They prevent faulty metabolism in the cell which can predispose a cell to becoming carcinogenic. Also blocks the formation of nitrous amines in the gut.Lemon juice is said to give a glow to the skin.

Vijayapur is one of the largest districts in Karnataka and has an area of 10541 sq Km. It consists of 5 Taluks *viz* Vijayapur, Basavan-Bagewadi, Indi, Muddebihal and Sindgi. Horticultural crops like lemon, grapes, pomegranate, guava, sapota, are also grown. Hence the study was undertaken with the objectives to estimate the Vitamin C content in different lemon varieties and to identify the physical characteristics of different lemon varieties of Vijayapura district.

II. METHODOLOGY

The study consisted of laboratory analysis. Laboratory analysis was undertaken for estimation of Vitamin C & to study physical properties in different varieties of lemon.

A. Collection of Sample

The lemons were collected from different villages of Vijayapura district for the study. Six fruits per entry were collected to analyse various physico-chemical characters. Physical parameters such as shape ,rind texture, fruit diameter, fruit length, fruit weight and total seeds were estimated.

B. Estimation of Ascorbic Acid (Vitamin C)

Ascorbic acid acts as an antioxidant and protects the cell membrane from the toxic action of powerful oxidizing agents. Ascorbic acid is found abundantly in berries, fresh fruits like citrus, guavas, chillies and green leafy vegetables. Estimation of ascorbic acid by volumetric and colorimetric methods was carried out. Ascorbic acid reduces the 2,-6-dichlorophenol indophenol dye to a colourless leuco-base. The ascorbic acid gets oxidized to dehytroascorbic acid. Though the dye is a blue coloured compound, the end product is the appearance of pink colour. The dye is pink coloured in acidic medium. Oxalic acid is used as the titrating medium.

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III. RESULTS AND DISCUSSION

Table 1: Physico-chemical characteristics of various lemons

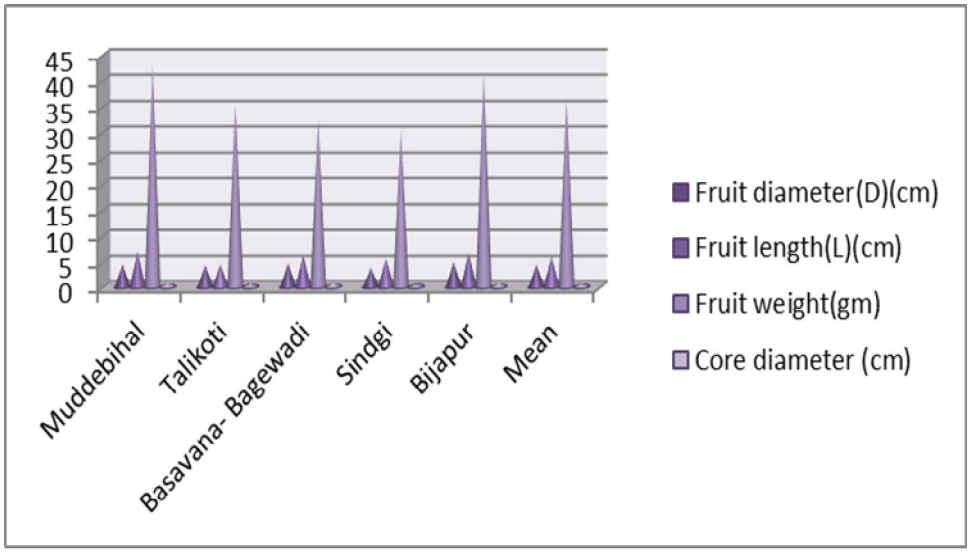
Name of the village	Fruit shape	Rind texture
Muddebihal	Spherical	Smooth
Talikoti	Hemi-Spherical	Smooth
Basavana- Bagewadi	Spherical	Rough
Sindgi	Spherical	Semi-smooth
Vijayapur	Hemi-Spherical	Smooth

Table 1 shows that among 5 villages , 3 villages recorded spherical shape, 2 villages recorded hemi-spherical shape.

1) *Rind Texture:* Table shows that among the 5 villages studies, 3 villages recorded smooth texture, one village recorded semi-smooth and one village recorded rough texture.

Table2 : Physico chemical characteristics of various lemons.

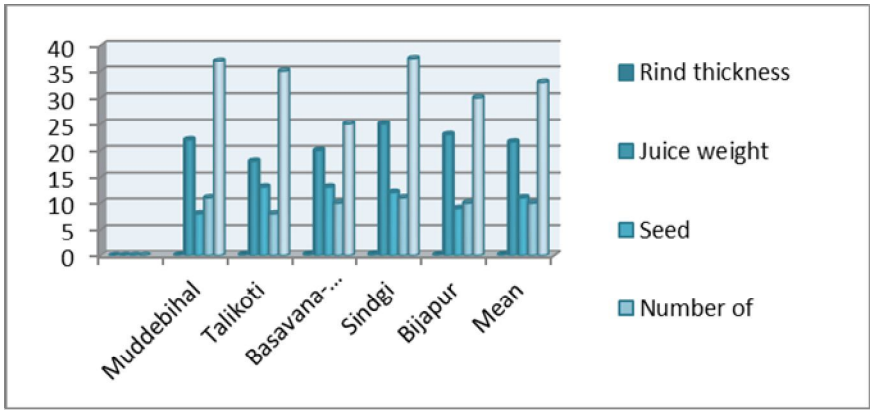
Name of the village	Fruit diameter(D) (cm)	Fruit length(L) (cm)	Fruit weight (gm)	Core diameter (cm)
Muddebihal	4.50	7.00	43.10	0.7
Talikoti	4.30	4.50	35.48	0.6
Basavana- Bagewadi	4.70	6.30	32.31	0.7
Sindgi	3.80	5.70	30.25	0.5
Vijayapur	4.90	6.70	41.30	0.7
Mean	4.44	6.04	36.48	0.64



2) *Fruit Diameter:* Table 2 shows that the average fruit diameter of lemon was recorded as 4.4 cm. The maximum fruit diameter of lemon (4.9 cm) was recorded in the Vijayapur and the minimum fruit diameter (3.8 cm) was recorded in the Sindagi.
3) *Fruit Length:* Table 2 shows that the average fruit length of lemon was recorded as 6.04 cm. The maximum fruit length of lemon(7 cm) was recorded in the Muddebihal and the minimum fruit length (4.5 cm) was recorded in the Talikoti.
4) *Fruit Weight:* Table 2 shows that the average fruit weight of lemon was recorded as 36.48 g. The maximum fruit weight of lemon (43.10g) was recorded in the Muddebihal and the minimum fruit weight (30.25 g) was recorded in the Sindagi.
5) *Core Diameter:* Table 2 shows that the average core diameter of lemon was recorded as 0.64 cm. The maximum core diameter of lemon (0.7 cm) was recorded in the Muddebihal, Basavana-bagewadi, Vijayapur and the minimum core diameter (0.5 cm) was recorded in the Sindagi.

Table 3: Physico-chemical characteristics of various Lemons

Name of the village	Rind thickness (cm)	Juice weight (ml)	Seed Number	Number of Articulations	Vitamin C (mg/100g Juice)
Muddebihal	0.10	22.00	08.00	11.00	37.00
Talikoti	0.20	18.00	13.00	08.00	35.00
Basavana- Bagewadi	0.25	20.00	13.00	10.00	25.00
Sindgi	0.30	25.00	12.00	11.00	37.50
Vijayapur	0.15	23.00	09.00	10.00	30.00
Mean	0.20	21.60	11.00	10.00	32.90



6) *Rind Thickness:* Table 3 shows that the average rind thickness was recorded as 0.20 cm. The maximum rind thickness of lemon (0.30cm) was recorded in the Sindagi and the minimum rind thickness (0.1 cm) was recorded in the Muddebihal.
7) *Juice Weight:* Table 3 shows that the average juice weight of lemon was recoded 21.60ml. The maximum juice weight of lemon (25m) was recorded in the Sindagi and the minimum juice weight (18m) a rod in the Talikoti
8) *Seed Number:* Table 3 shows that the average seed number of lemon was recorded as 11, The maximum seed number of lemon (13) was recorded in the Talikoti and Basavana- bagewadi and the minimum seed number (8) was recorded in the Muddebihal.
9) *No of Articulations:* Table 3 shows that the average no of articulations of lemon was recorded as 10. The maximum no of articulations of lemon (1) was recorded in the Muddebihal and Sindagi and the minimum no of articulations (8) was recorded in the Talikoti.
10) *Vitamin C:* Table 3 shows that the average vitamin C content of lemon was recorded as 32.90 mg/100g. The maximum vitamin C content of lemon (37.5 mg/100g) was recorded in the Sindagi and the minimum vitamin C content of lemon (25 mg/100g) was recorded in the Basavana- Bagewadi.

Table 4: Mean, range, Standard deviation and coefficient of variation for physico-chemical characteristics of lemons

Parameter	Mean	Range	Standard deviation	Coefficient of variation
Fruit diameter(cm)	4.4	3.0-4.90	0.1886	4.24
Fruit length(cm)	6.04	4.50-7.00	0.4422	7.32
Fruit weight(g)	36.48	30.25-43.10	2.4923	6.83
Core diameter(cm)	0.64	0.5-0.7	0.04	6.25
Rind thickness(cm)	0.20	0.1-0.3	0.0353	17.65
Juice weight(ml)	21.60	18-25	1.208	5.59
Seed number	11	8-13	1.048	9.52
No of Articulation	10	8-11	0.3872	3.87
Vitamin C(mg/100g Juice)	32.90	25.00-37.50	2.366	7.39

11) *Fruit Diameter:* Table 4 shows that the mean fruit diameter of 4.4 cm was recorded with 4.24 per cent of coefficient of variation and it ranged from 3.80-4.90 cm.
12) *Fruit Length:* Table 4 shows that the mean fruit length of 6.04 cm was recorded with 7.32 Per cent of coefficient of variation and it ranged from 4.50-7.00 cm.
13) *Fruit Weight:* Table 4 shows that the mean 6.83 per cent of coefficient of variation fruit weight of 36.48 g was recoded with and it ranged from 30.25-43.10g.
14) *Core Diameter:* Table 4 shows that the mean core diameter of 0.64 cm was recorded with 6.25 per cent of coefficient of variation and it ranged from 0.5-0.7 cm.
15) *Rind Thickness:* Table 4 shows that the mean rind thickness of 0.20 cm was recorded with 17.65 per cent of coefficient of variation and it ranged from 0.1-0.3 cm.
16) *Juice Weight:* Table 4 shows that the mean fruit juice weight of 21.60 ml was recorded with 5.59 Per cent of coefficient of variation and it ranged from 18-25 ml.
17) *Seed Number:* Table 4 shows that the mean fruit seed number of 11 was recorded with of coefficient of variation and it ranged from 8-13 in number. 9.52 per cent of variation and it ranged from 8-13 in number.
18) *Core Diameter:* Table 4 shows that the mean core diameter of 0.64 cm was recorded with 6.25 per cent of coefficient of variation and it ranged from 0.5-0.7 cm.
19) *Rind Thickness:* Table 4 shows that the mean rind thickness of 0.20 cm was recorded with 17.65 per cent of coefficient of variation and it ranged from 0.1-0.3 cm.
20) Juice Weight: Table 4 shows that the mean fruit juice weight of 21.60 ml was recorded with 5.59 per cent of coefficient of variation and it ranged from 18-25 ml.
21) *Seed Number:* Table 4 shows that the mean fruit seed number of 11 was recorded with 9.52 per cent of coefficient of variation and it ranged from 8-13 number.
22) *No of Articulations:* Table 4 shows that the mean no of articulations of 10 was recorded with 3.87 per cent of coefficient of variation and it ranged from 8-11 in number.
23) *Vitamin C:* Table 4 shows that the mean vitamin C of 32.90mg/100g juice was recorded with 7.39 per cent of coefficient of variation and it ranged from 25-37.5 mg/100g juice.

IV. CONCLUSION

There is a significant variability observed for physico-chemical characters and in content of vitamin c in different varieties of lemon fruits.

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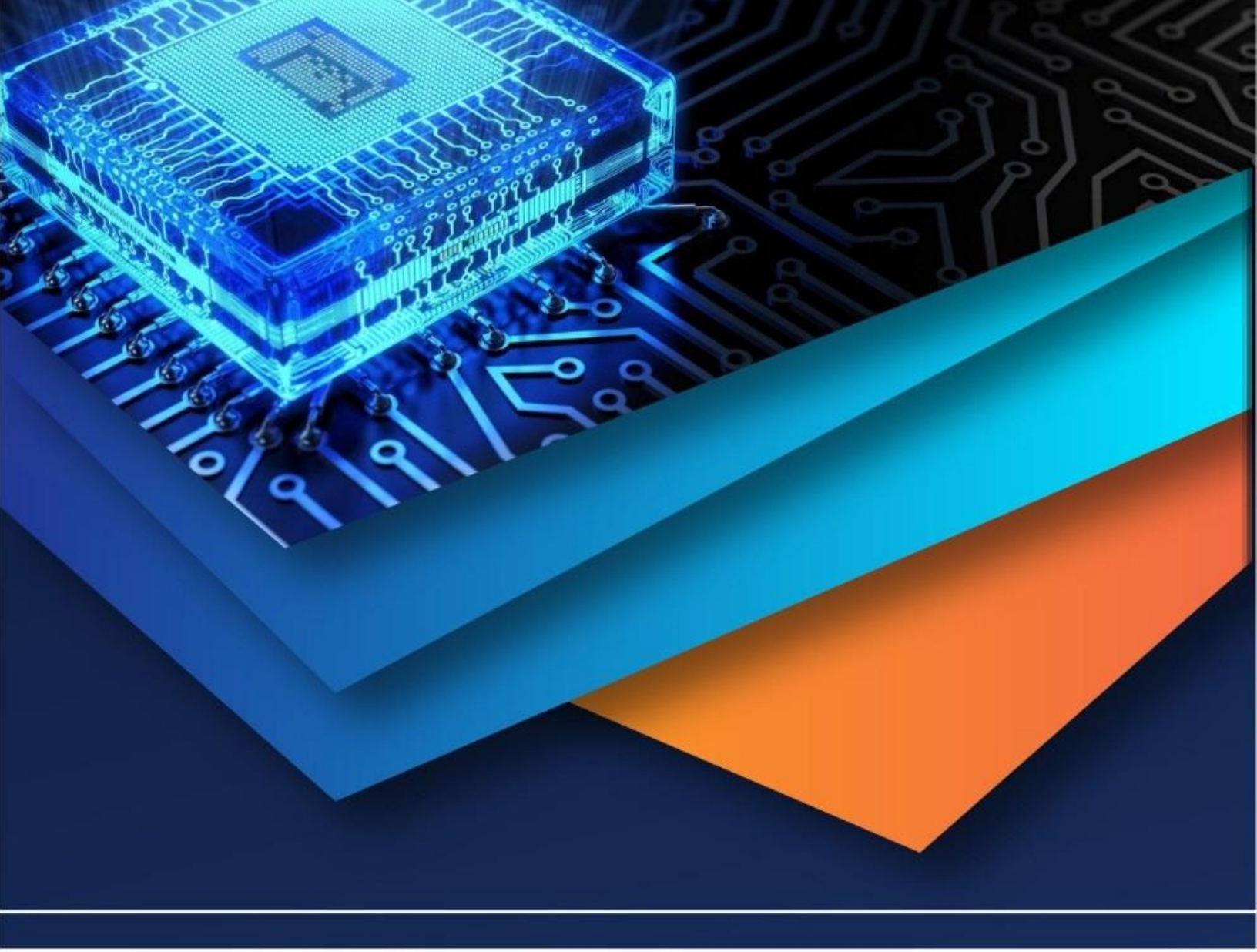

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