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Comparative study on Physico & Phyto-Chemical analysis of Persea americana & Actinidia deliciosa

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Abstract- The main aim of the present investigation is to determine the Moisture Content, Total ash, Acid insoluble ash, Water soluble ash, Alcohol soluble Extractive value and proximate analysis of *Persea americana* & *Actinidia deliciosa* fruit. The fruit samples were shade dried, powdered and used for further analysis. The phytochemicals were studied using the six different solvents extracts such as aqueous, ethanol, ethyl acetate, chloroform, petroleum ether and methanol. Among them aqueous, ethanol, ethyl acetate extract has shown the presence of potential components which act as antioxidants.

Index Terms- Total ash, Water soluble ash, Alcohol soluble, Phytochemicals, Proximate analysis.

I. INTRODUCTION

The plant phytochemical is a natural bioactive component which serves as nutrients and dietary fiber to protect against diseases. They in turn activate antioxidant defenses, signal transduction pathways, gene expression, multiplication of cell and differentiation (Mandel *et al.,* 2005). The fruit and vegetable consumption reduces the lowered incidence of degenerative disease including cancer, heart disease, inflammation, arthritis, immune system decline, brain dysfunction and cataracts (Ames, 1983; Gordon, 1996; Halliwell. B, 1996).

Persea americana belongs to a Lauraceae family, commonly known as avocado. The Leaf extracts have been employed as antibiotics, treatments for hypertension, diarrhoea, sore throat and regulate menstrual cycle. (Craignil 1984; Crisi and Belsito 1995). They also possess anti-inflammatory and analgesic activities (Adeyemi *et al.,* 2002).The seeds extracts were used to treat diarrhea, dysentery, toothache, intestinal parasites, skin treatment .(Lopez *et al.,* 1996; Roger, 1999). The antioxidant activity and phenol content of the avocado seed was found to be 70% (Song and Barlow, 2004). The fruit is low in simple sugars and contains appreciable levels of dietary fibers (Bergh, 1992). The fruits extracts reduces fat absorption, constipation, lower glycemic index and plasma insulin levels, microbial proliferation and controls plasma cholesterol (Kritchevsky *et al*., 1995). It is involved in regulation of normal intestine performance, risk factors for diabetes, obesity, gall stones, hyper cholesterolemia and heart diseases (Gray, 1995).

Actinidia deliciosa commonly known as Kiwifruit, belong to the family Actinidiaceae and are distributed throughout the world, especially in eastern Asia. Traditionally they have been used to treat different cancers, including those of the digestive system (Ye. M.H, 1979; Zhi C.J 1980). They are rich in bioactive compound polyphenols (Park *et al.* 2006). It contains glucose and fructose and low amount of sucrose (Nishiyama, 2007). It lowers blood triglycerides and prevents atherosclerosis and other diseases (Motohashi *et al.*, 2002; Duttaroy and Jorgensen 2004). The present investigation was aimed to study the pharmacological properties of the *Persea americana* & *Actinidia deliciosa* fruit by physico chemical and preliminary phytochemical analysis.

II. MATERIALS AND METHODS

A. Collection and processing

Edible fresh fruit materials of *Persea americana* and *Actinidia deliciosa* were procured from the Supermarket, Chennai, and authenticated by Dr. J. Jayaraman, Director, Plant anatomy Research Centre, West Tambaram. The fruits were thoroughly washed and remove the peel of both *Persea americana* and *Actinidia deliciosa* (with seeds) were shade dried, finely powdered and used for the physico chemical analysis, proximate analysis. To study phytoconstituents about 50gm of fresh fruits were minced and defatted using 50 ml of ethanol & distilled water at room temperature (27°C) at an atmospheric pressure for 3 days by shaking at 100rpm /min speed. The extract was filtered, concentrated and used to determine the quantitative analysis.

B. Physico chemical analysis

Determination of Moisture content:

5 gm of powdered fruit samples were transferred in to a Petri dish and the contents were distributed evenly about 7 .5 cm in diameter and to a depth of 2.5 cm. The tarred samples were air dried in an oven at 105^0 C for 5 to 6 hours, kept in desiccators (to cool) and weighed at different time intervals until a constant weight was obtained. The processes were repeated until the difference in two successive weights are less than 1 mg. The difference in weight after drying and initial weight is the moisture content. Respective moisture content (%) for the samples was calculated.

Total ash value:

About 5gm of powdered fruit samples were tarred in a crucible and incinerated at 550 ± 10°C in muffle furnace until free from carbon. The crucible was cooled and weighed. The process were repeated and weighed until the difference between two successive weighing is less than 1 mg and recorded the lowest weight. Percentage of total ash was calculated with reference to air-dried substance.

Acid insoluble ash:

Ash obtained from total ash was boiled in 25ml of 2N HCl for 5 minutes by covering the Silica dish with a watch glass to prevent spattering. Then the filtrates were filtered using ash less filter paper. The filter paper was transferred into a silica dish and incinerated at 550°C for 2 hours in muffle furnace until free from carbon. Percentage of acid insoluble ash was calculated with reference to air-dried substance.

Water soluble ash:

Weighed 5 gm of powdered fruit samples were dissolved in about 200 ml of distilled water and connected to reflux condenser for 1 hour over low flame with occasional mixing. The samples were later cooled and filtered in a Whatman No 1 filter paper. The filter paper was washed and tarred in an aluminum dish. Evaporate on a steam bath and transfer to 100°C air oven and dry for 2 hours. Samples were dried again for 30 minutes, cooled in desiccators and weighed. The experiment was repeated twice, and the average value was taken (Handbook of Food Analysis, 1984).

Alcohol soluble extraction:

5 gm of powdered fruit samples were macerated with 100 ml of alcohol in a Stoppered flask with frequent shaking during first 6 hrs and allowed to stand for 18 hrs. It was filtered after 24 hrs. 25 ml of the filtrate was evaporated in a tarred dish at 105°C and weighed. Alcohol soluble extractive values were calculated. The experiment was repeated twice, and the average value was taken (WHO, 1998).

C. Proximate analysis

Estimation of Carbohydrate

100 mg of the fruit samples were weighed and hydrolyzed with 5 ml of 2.5 N Hydrochloric acid, cooled at 37º C and neutralized with solid sodium carbonate until the effervescence ceases. The volume was made up to 100 ml and centrifuged. The supernatant was collected and 0.5ml and 1 ml aliquots were taken for analysis. Standards were prepared by taking 0.2, 0.4, 0.6, 0.8 and 1ml of the working standard glucose and the 1ml of distilled water served as the blank. 4 ml of anthrone reagent was added in all tubes and heated for 8 minutes in a boiling water bath. Then cooled rapidly and the readings were taken at 630 nm. The carbohydrate content of the fruits was calculated by comparing with the standard curve (Hedge and Hofreiter, 1962).

Estimation of Protein:

5 g of powdered fruit samples were extracted 3 times with 50 ml of water by overnight cold percolation method. To 0.5 ml of sample, blank and standard taken in duplicate, 0.5ml of alkaline copper reagent was added, mixed and allowed to stand undisturbed for 10 minutes. Then 2 ml of phenol reagent was added to each tube; mixed immediately and placed at room temperature for 5 minutes and absorbance of samples and standard were taken at 615 nm against blank. The protein content of fruits was calculated by comparing with the standard curve **(**Rahuramulu *et al.,* 2003).

Estimation of Fat:

5 g of powdered fruit samples were placed in a soxhlet fitted with a condenser**.** 90 ml of petroleum ether (boiling point 40- 60 °C) was taken in a 150 ml round bottom flask and boiled for 6 hours. The extract was taken in a pre- weighed conical flask and petroleum ether was evaporated on a water bath. The traces of petroleum ether were removed using a vacuum pump (AOAC, 2005).

$$\text{Percentage of Fat content} = \frac{\text{Weight of petroleum ether extract}}{\text{Weight of the sample taken}} \times 100$$

Determination of Fiber:

About 5 g of moisture and fat free fruit samples were weighed, added 200 ml of 0.255 N (1.25% W/V) sulphuric acid, boiled for 30 minutes and the volume was kept constant by the addition of water at frequent intervals. The mixture was filtered and the residues were washed with hot water until it was free from acid. To the filtrate then added 200ml of 1.25% sodium hydroxide and boiled for 30 minutes. The mixture was filtered and the residues were washed with hot water till it was free from alkali, followed by washing with some alcohol and ether. It was then transferred to a crucible, dried over night at 80-100°C and weighed (We). The crucible was heated in a muffle furnace at 60°C for 2-3 hours. It was cooled and weighed again (Wa). The difference in the weights (We-Wa) represents the weight of fiber (Raghuramulu *et al.,* 2003).

$$\text{Fiber content} = \frac{[100-(\text{moisture} + \text{fat})]}{\text{Wt. of the sample taken}} \times (\text{We} - \text{Wa})$$

D. Phytochemicals Analysis:

The phytochemicals analysis of the fruit samples were carried out to identify the constituents, using standard phytochemical methods as described by Harbone (1973); Sofowora (1993). The screening involves detection of secondary metabolites such as flavonoids, alkaloids, tannins, phenols, saponins, coumarins, steroids and terpenoids.

III. RESULTS AND DISCUSSION

The proximate values such as moisture content, total ash, ash insoluble in acid, alcohol soluble extractive, water soluble ash were carried out (Table I). The proximate analysis of both the samples reveals that the *Actinidia deliciosa* has higher fat and protein content than *Persea americana* fruit, whereas fiber content of both the fruits are equivalent (Table II). *Actinidia deliciosa* contains vitamin-C, Vitamin E, Folic acid and various phytochemicals such as anthocyanidins and flavonols (Wills *et al.,* 1986; Ferguson and Ferguson 2003). *Persea americana* are rich sources of bioactive phytochemicals (Ding *et al.,* 2007)

The preliminary phytochemical screening of different solvent extract reveals the presence of phenol, flavonoids and alkaloids (Table III, IV). The medicinal values of plant depends on the phytochemicals such as alkaloids, flavonoids, phenolic compounds and other nutrients like as amino acid, proteins, which produce a definite physiological action on the human body (Abhishek B, Avinash .S, 2013)

IV. CONCLUSION

The present investigation on proximate analysis has shown that both the *Persea americana* and *Actinidia deliciosa* fruit has potential Chemical constituents. The phenol and flavonoid may be the potential chemo preventive and anticancer substances. The Fiber content of the both the fruit might contribute to reducing the problems due to various diseases of both the fruits. Further studies are in progress to quantify and determine the antioxidant properties.

Table I. Physico Chemical Analysis

S.No.	Parameter	*Persea americana* (% W/W)	*Actinidia deliciosa* (% W/W)
1.	Loss on drying	7.02± 0.5	19.76±1.0
2.	Total ash content	2.97±0.1	4.083±0.2
3.	Acid insoluble ash	2.5±0.1	4.1±0.2
4.	Alcohol soluble ash	65.33±2.3	78.35±4.8
5.	Water soluble extract	23.11±1.5	15.33±1.2

Values were expressed as mean ± S.D for 6 different preparations.

Table II. Proximate Analysis

S.No.	Parameter	*Persea americana* (gms)	*Actinidia deliciosa* (gms)
1.	Carbohydrate	32.07±2.7	24.71±1.5
2.	Protein	39.01±2.5	41.14±3.1
3.	Fat	2.03±0.1	3.593±0.2
4.	Fibre	3.11±0.2	3.11±0.1

Values were expressed as mean ± S.D for 6 different preparations.

Table III. Phytochemical analysis of *Persea Americana*

S.No.	Parameter	Aqueous	Ethanol	Ethyl acetate	Chloroform	Petroleum ether	Methanol
1.	Phenols	+++	+++	++	++	+	++
2.	Terpenoids	+++	+++	++	++	+	++
3.	Tannins	-	+	+	-	-	++
4.	Saponins	-	+++	+	++	+++	++
5.	Flavonoids	+	+++	++	++	+	
6.	Steroids	++	+++	++	+	+	+
7.	Alkaloids	+	-	++	-	+	++
8.	Carbohydrates	++	-	+++	++	-	
9.	Proteins/Amino acids	++	++	+	+	+	+
10.	Quinones	+++	++	++	++	+++	++
11.	Coumarins	-	+++	-	+	+	-

Where as:
+++: Strongly present
++ : Mildly Present
+ : Present
- : Absent

Table IV. Phytochemical analysis of *Actinidia deliciosa*

S.No.	Parameter	Aqueous	Ethanol	Ethyl acetate	Chloroform	Petroleum ether	Methanol
1.	Phenols	+++	+++	++	+	+	+++
2.	Terpenoids	+++	++	++	+	+	+
3.	Tannins	-	+	+	+	-	+
4.	Saponins	-	-	-	-	+	-
5.	Flavonoids	++	+	++	+	+	+
6.	Steroids	+	+	+	+	+	-
7.	Alkaloids	++	++	++	+	+	-
8.	Carbohydrates	++	++	+	+	+	++
9.	Proteins/Amino acids	++	+	+	+	+	+
10.	Quinones	++	+	++	+	+	+
11.	Coumarins	+	++	++	++	+	++
12.	Acid	++	++	+	+	-	++

Whereas:
+++: Strongly present
++ : Mildly Present
+ : Present
- : Absent

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