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Evaluation of antioxidant activity from of some medicinal plant fruits

Bagal S N[1], Patil M S[2], Pise N M[1*], Satpute M D[1]
[1] Karmaveer Bhaurao Patil Mahavidyalaya, Pandharpur, Maharashtra, India
[2] Sadguru Gadage Maharaj College, Karad, Maharashtra, India

Abstract
The antioxidant properties of the following medicinal plants were studied, *Hylocerus undatus* (Dragon fruit), *Actinidia deliciosa* (Kiwi fruit), and *Psidum guajava* (Gauva fruit) pulps and peels were analyzed for total polyphenol, ascorbic acid, 1, 1-Diphenyl-2, Picryl-Hydrazyl, carotenoid, and reducing power. The highest concentration of ascorbic acid was found in Dragon and Kiwi fruit pulp. Carotenoid and polyphenol content were highest in Kiwi pulp, with a significant amount of ascorbic acid, carotenoid, and polyphenols recorded in Guava fruit pulp and peel. Based on the current findings, it is concluded that the indigenous Guava fruit is the main source of natural antioxidants and dietary polyphenols when compared to foreign coastally Kiwi and Dragon fruit.

Keywords: antioxidant, polyphenols, carotenoids, DPPH

Introduction
A Dragon fruit, *Hylocereus undatus* plant, is belong to family cactaceae. It is locally known as pitahaya fruit (Ruzlan *et al*., 2008) [18]. It is a native fruit of Mexico and Central South America (Mello *et al*., 2015) [13]. The ideal climate for growing dragon fruit is dry, tropical or subtropical with an annual rainfall ranging from 22 to 50 inches per year (Halimoon and Hasan, 2010) [9]. These fruits are harvested when their skins have turned 85% red, indicating that they have fully extended and developed (Ruzlan *et al*., 2008) [18]. The Kiwi fruit, *Actinidia deliciosa*, is a member of the actinidiaceae family. These fruits can be found around the world, but they are most common in eastern Asia. It has been extended in India to the mid-hills of Himachal Pradesh, Jammu and Kashmir, and Arunachal Pradesh (Atkinson and Macrae 2007) [4]. It was found that Kiwi fruit is high in ascorbic acid and polyphenols. Ascorbic acid, as an antioxidant, has been linked to a lower risk of arteriosclerosis, cardiovascular disease, and some kinds of cancer (Harris, 1996) [10]. The polyphenolic and flavonoids compounds also have antioxidant characteristics (Wong *et al*., 2006) [22]. Kiwi fruits are used for the treatment of many different types of cancers such as stomach, lung, and liver cancer (Yang, 1981) [1]. Some studies in conventional medicine have shown that extracts of Kiwi fruits inhibit cancer cell growth (Song 1984) [19]. The *Psidium guavaja* L. is a fruit-bearing tree in the Myrtaceae family (Morton, 1987). Guava is found almost everywhere in India. It is grown commercially in nearly all states, with a total area of about 50,000 hectares. Guava fruit is grown in the following Indian states: Uttar Pradesh, Bihar, Maharashtra, Assam, West Bengal, and Andhra Pradesh (Wealth of India, 2003) [24]. Guava fruit is high in tannins, phenols, triterpenes, flavonoids, essential oils, saponins, carotenoids, lectins, vitamins, fibre, and fatty acids, among other nutrients.

Material
This study focused on three fruits *Hylocereus undatus*, *Psidium guavaja*, *Actinidia deliciosa* The Dragon and Kiwi were bought at a nearby market. The fruits of the guava are harvested in the Pandharpur tashil of Solapur District, Maharashtra.

Methods
1. Carotenoid Content
Carotenoids were extracted using a weighted amount of peel and pulp material. Kirk and Allen's method was used to calculate the amount of carotenoid (1965). The weighted amount of Peel and pulp material was used to extract carotenoids. The amount of carotenoid was calculated using Kirk and Allen's approach (1965). A double beam spectrophotometer was used to measure the absorbance at 480 nm (Shimadzu). The total carotenoid were determined using the formula below.

$$\text{Total Carotenoids (mg 100 g}^{-1}\text{ fresh weight)} = \frac{A_{480} \text{ X vol. of extract X 10 X 100}}{2500 \text{ X weight of plant material (g)}}$$

Where, 2500 = average extinction.

2. Ascorbic acid content

The volumetric method was used to calculate the ascorbic acid content (Sadasivam & Manickam, 1992).
Ascorbic acid content was estimated by volumetric method (Sadasivam & Manickam, 1992). Exactly 5 ml of the working standard solution was taken into a 100 ml conical flask, to this 10 ml of 4% oxalic acid was added and this was turned to pink colour end point when titrated against the dye solution (V1 ml). The amount of the dye consumed was equivalent to the amount of ascorbic acid. One gram Plant material was weighed and crushed using 4% oxalic acid. The extract was filtered through Whatman No.1 filter paper and made the volume up to 100 ml.

$$\text{Calculations Amount of ascorbic acid mg/100ml} = \frac{0.5\ \text{mg} \times \text{V2 ml} \times 100\ \text{ml} \times 100}{\text{V1} \times 5\ \text{ml} \times \text{weight of sample}}$$

3. Total polyphenol content

The method of Folin and Denis (1915) was followed for determination of the total polyphenol content. Folin and Denis (1915) method Used for the analysis of polyphenols.Crush 0.5gm of washed peel and pulp & blotted plant material these plant material crush in morter and pestle throughly & extract in 80% aceetone. filter it thoroughly with Buchner funnel and wash the residue two times with 80% acetone and collect the filtrate and make the final volume of filtrate 50 ml, use this filtrate for estimation of polyphenols. Take 50 ml marked nesselers tubes label them properly &take different ingredents in then as shown in observation table mix all ingredents well and after some time measure absorbance of each mixture at 660 nm using Spectrophotometer equipped with red filter from the observations of absorbance formula, which is passing through the origin the polyphenols present in reaction mixture are calculated polyphenols present in 100 gm of plant material can be calculated.

$$\text{Polyphenol (gm /100gm fresh weight) were calculated using the following formula:} \frac{\text{Absorbance} \times \text{Std. Tannic acid} \times \text{Vol. of .Extract} \times 100}{\text{Std .Abs} \times \text{ml .taken for assay} \times \text{weight of plant material}}$$

4. DPPH

Antioxidant activity in the Peel and pulp on Dragon, Kiwi and Guava fruit extracts were estimated for their free radical scavenging activity by using DPPH (George *et al*., 1996). Antioxidant activity in the Peel and pulp on Dragon, Kiwi and Guava fruit extracts were estimated for their free radical scavenging activity by using DPPH (George *et al*.,1996). The 100 µL of peel and pulp extracts were taken in the microtiter plate. 100µL of 0.1% methanolic DPPH was added over the samples and incubated for 30 minutes in dark place. The samples were then observed for discoloration; from purple to yellow and pale pink were considered as strong and weak positive respectively and read the plate on Elisa plate reader at 490 nm.

5. Reducing power

In contrast, the reducing power in methanol extracts was determined by modifying the Oyaizu method (1986). The standard was ascorbic acid solution (ASA).

Result and Discussion

Carotenoid Contain

The present study Dragon peel has 0.5 mg/100 gm, and pulp has 0.2 mg/100 gm, Kiwi fruit peel has 1.4 mg/100 gm, and pulp has 0.3 mg/100 gm, and Guava peel has 0.9 mg/100 gm and in pulp has 0.2 mg/100 gm, in comparison to local fruit Guava peel has 0.9 mg/100 gm and pulp has 0.2 mg/100gm. The current research of three plant species found that the carotenoid concentration of Kiwi fruit peel is the highest, followed by Guava peel, whereas Dragon pulp and guava pulp having similar carotenoid concentrations. In Dragon fruit carotenoid contain is 0.86 ± 0.01mg/100 gm (victor M. Moo-Huchin *et al*.) In kiwi fruit Total carotenoid and total chlorophyll content was shown to be 0.53±0.06 mg/100g and 2.58±0.08 mg/100g respectively. Among the 5 different carotenoid compounds identified in this fruit, lutein, which was accompanied by two minor cis-isomers (neolutein A and B), was the most abundant component (60%), followed by β-carotene, neoxanthin and violaxanthin. (Cano 1991) [7].

Polyphenol contain

The maximum polyphenol concentration was found in Kiwi pulp (4.43 mg/100 g) when compared to Dragon pulp (3.28 mg/100 g) and Guava pulp (2.48 mg/100 g) in this study. Polyphenol was found in Dragon Peel (0.121 mg/100 gm), Kiwi Peel (0.243 mg/100 gm), and Guava Peel (0.162 gm/100 gm) in the current investigation. Polyphenol was discovered in Dragon Peel, Kiwi Peel, and Guava Peel in the current study. According the findings, Kiwi pulp had the highest polyphenol concentration when compared to Dragon pulp and Guava pulp.

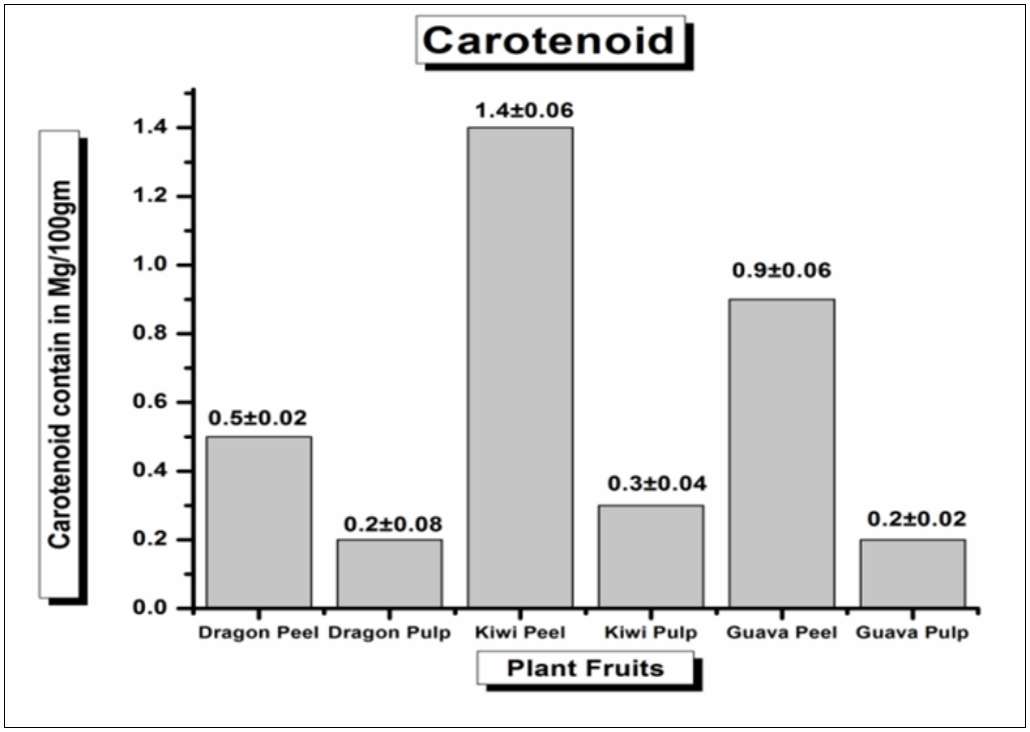

Fig 1: Carotenoid content insome medicinal plant fruits

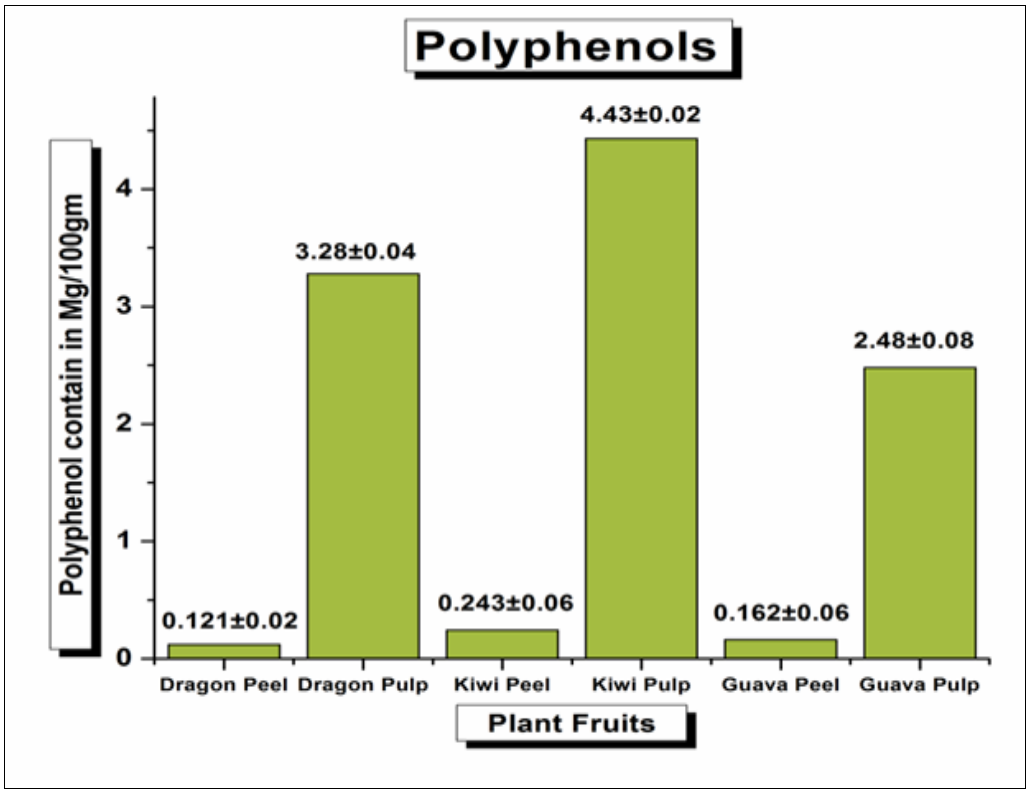

Fig 2: Polyphenol Contain insome medicinal plant fruits

Polyphenolic compounds were reported to be commonly found in both peel and pulp of dragon fruit (Wojdylo *et al*., 2007) [33]. The kiwi fruit was found to be more abundant in polyphenols and flavonoids than the flesh, with contents of 12.8 mg/g and 2.7 mg/g, respectively. **(**Aamina Alim *et al*. 2019) [1] The antioxidant activity of polyphenol compounds was studied, (2.62−7.79 mg/100gm (Antonio Jiménez-Escrig, *et al* 2001) [3].

Ascorbic acid contain

The Dragon peel has 65 mg/100 gm of, while Dragon pulp contains 80 mg/100 gm. Kiwi peel contains 67 mg per 100 gm, Kiwi pulp has 87 mg per 100 gm, while Guava peel has 60 mg per 100 gm, Guava pulp has 85 mg per 100 gm. In correlation to Dragon and Kiwi fruit, Kiwi Pulp has the highest concentration of ascorbic acid

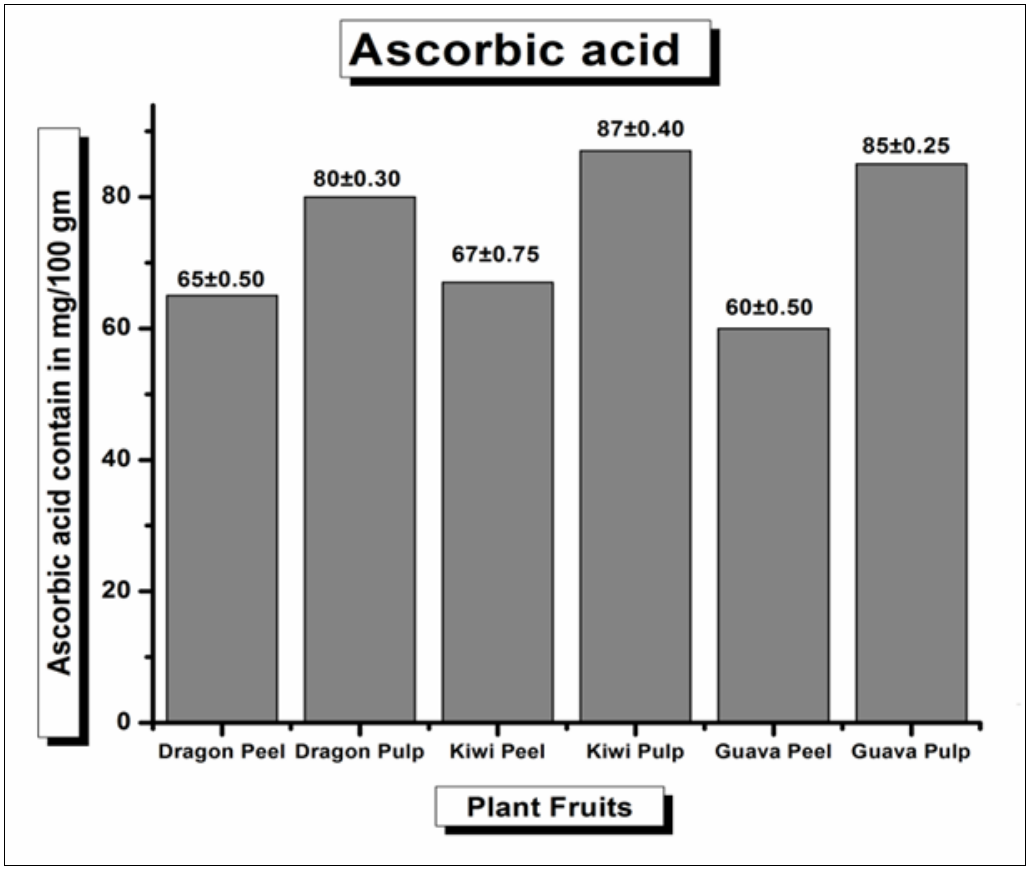

Fig 3: Ascorbic acid contain insome medicinal plant fruits

H. undatus Fruit Pulp have 31.05 ± 1.22 mg/100 gm (Wee Sim Choo* and Wee Khing Yong) The ascorbic acid content of the pulp of *H. polyrhizus* in this study was relatively that (8.0 ± 1.6 mg/100g) of (Lim *et al*.) The ascorbic acid content of pulp of *H. undatus* (55.8 ± 2.0 mg/100g) was found to be higher than that of *H. polyrhizus* (13.0 ± 1.5 mg/100g). Mahattanatawee *et al*.

Extracted the given study the Dragon peel has 65 mg/100 gm of ascorbic acid, while Dragon pulp contains 80 mg/100 gm. The vitamin C content of green and gold kiwifruit is 92.7 and 161.3 mg per 100 g, respectively US Department of Agriculture (2016). In the EuropeanUnion, the Reference Intake (RI) for vitamin C for labelling purposes is 80 mg [European Commission 2011] The given data showes Kiwi peel contains 67 mg per 100 gm, Kiwi pulp has 87 mg per 100 gm, Luximon-Ramma *et al*. (2003) have also reported that white pulp guavas had higher AA and TPH than pink pulp guavas in which the AA was 142.6 and 72.2 mg/100 g in white and pink pulp, respectively. In given result shows while Guava peel has 60 mg per 100 gm, Guava pulp has 85 mg per 100 gm.

DPPH activity

Total DPPH activity is 92% in Dragon peel, 74% in Dragon pulp, and 80% in Guava peel, with 70% in Guava pulp; whereas Kiwi peel has 95% and Kiwi pulp has 80%.

The comparative analysis revealed that Kiwi peel has the highest DPPH activity. The peel and pulp of guava, on the other hand, are high in antioxidants.

In comparison the methanol ex-tracts showed a high in dragon fruit 97.40% ±.0061% (Ayub Md Som *et.al* 2019) [5]. The kiwi fruit DPPH activity is 90± 005% (Ying Wang *et al*. 2018) [30].

In dragon fruit DPPH assay was carried out to measure the primary antioxidant activity of each sample in present study. The ability to remove or scavenge free radicals is classified as primary antioxidant (Wang *et al*., 2008) [30]. DPPH assay reaction depends on the ability of the samples to scavenge free radicals which is visually noticeable as the colour change from purple to yellow due to hydrogen donating ability (Ajila *et al*., 2007). The more rapid the absorbance decreases, the more potent the primary antioxidant activity (Siddhuraju *et al*., 2002) [28].

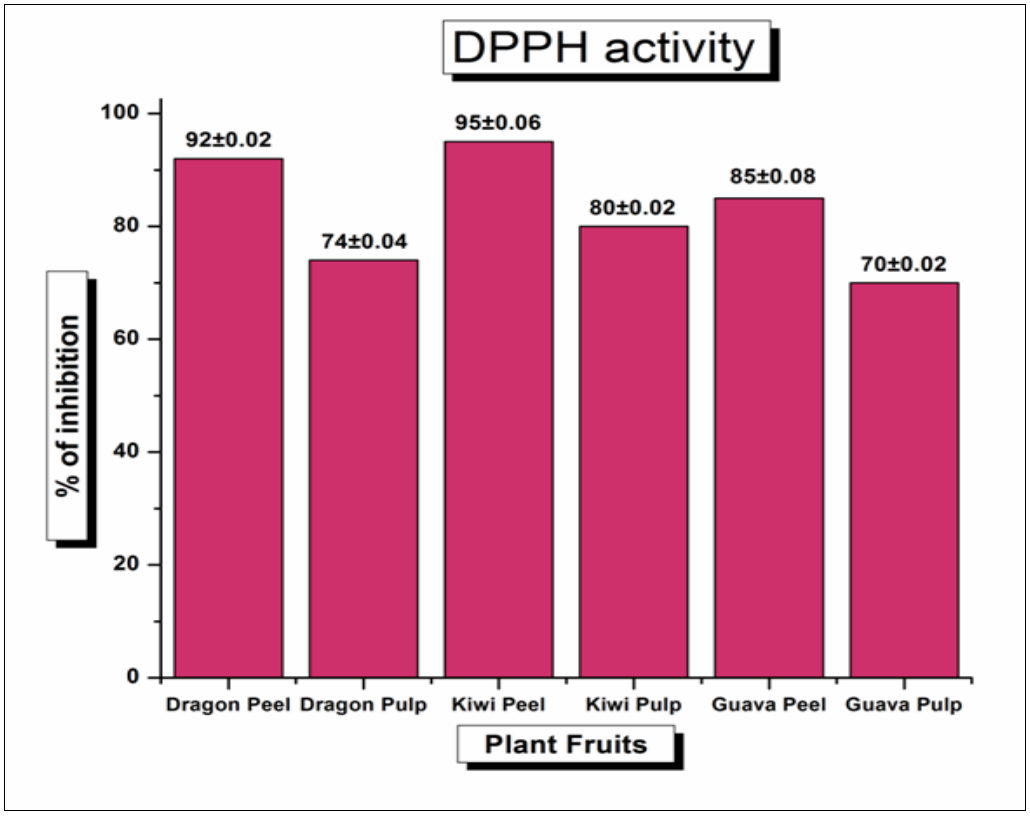

Fig 4: DPPH Activity insome medicinal plant fruits

Reducing Activity

Total reducing activity is 0.19 in Dragon peel, 0.25 in Dragon pulp, 0.18 in Guava peel, and 0.22 in Guava pulp, compared to 0.21 in Kiwi peel and 0.34 in Kiwi pulp. According to the findings, Kiwi pulp and peel have the highest reducing power when compared to Dragon and Guava. The ranking of guava fruits in terms of reducing action obtained in the present work is in line with literature reports Leong (L.P and Shui G 2002) and (Samee W *et al*. 2006)

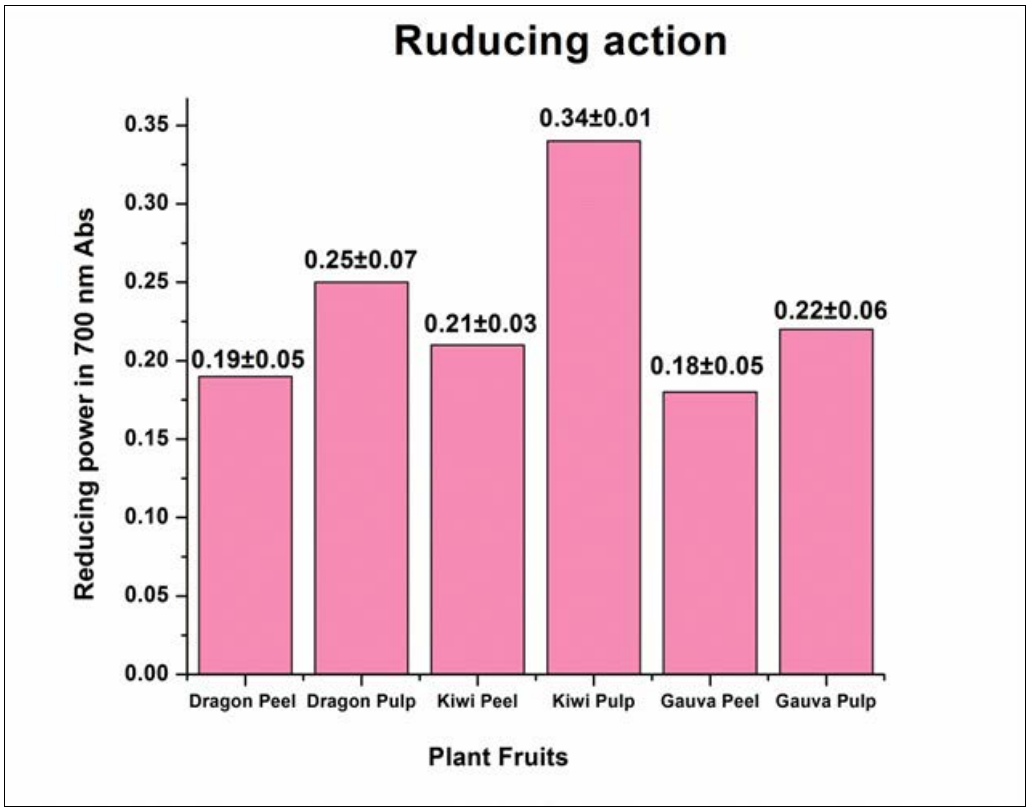

Fig 5: Reducing action insome medicinal plant fruits

Conclusion

The antioxidants ascorbic acid, polyphenols, and carotinoides were found in high concentrations in *Hylocerus undatus*, *Actinidia deliciosa*, and *Psidum guajava* in the present study. As a result, we concluded that all of the excellent plant fruits we chose are nutritious and healthy because they contain an abundance of antioxidants. According to the study's findings, guava fruit is the primary source of natural antioxidants and dietary polyphenols when compared to foreign coastally fruit.

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