

**IN VITRO STUDY OF PHYTONUTRIENTS –ANTIOXIDANT AND
ANTINUTRITIONAL PROPERTIES OF KIWIFRUIT (*Actinidia deliciosa*)**

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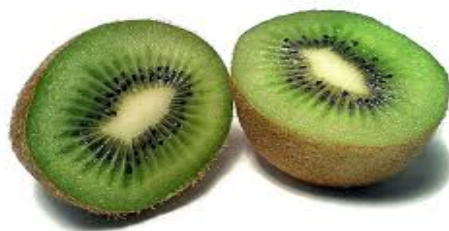
ABSTRACT

Kiwifruit (*Actinidia lindl* spp)is one of the few new fruit crops accepted by international market in recent years. Kiwifruit is a good source of several vitamins, minerals and fibre, contains phytochemicals, which makes it suitable candidate as a fruit based functional food or ingredient .In the present study, antioxidants and anti nutritional factors present in Kiwifruits (*Actinidia deliciosa*) were examined employing different in vitro assay methods. The assay revealed that this health protective kiwifruits have good antioxidant and low anti nutritional content. Result showed that the total flavonoids and total phenol content of the kiwifruit was 6.25mg quercetin eq/100gm of sample & 8.8 mg gallic acid eq/100gm of sample respectively. Whereas DPPH activity was also measured where the value of IC 50 was 100mg/ml. The quantitative determination of kiwifruit revealed that it contains 0.151 gm of phytate and 0.6 gm alkaloids per 100gms of sample.

KEYWORDS: Antioxidant, Antinutritional factors, Total flavonoids, Total alkaloids, DPPH, Phytate

INTRODUCTION

The kiwifruit often shortened to kiwi in many parts of the world is an edible berry of a woody vine in the genus *Actinidia* .Kiwifruits are native to Southeast Asia. The most common kiwifruit species grown commercially is *Actinidia deliciosa* cultivar Hayward. (Bernadine et al.,2005)



The most common cultivars of kiwifruit are oval in shape, about the size of a large hen's egg (5–8 cm / 2–3 in long and 4.5–5.5 cm / 1¾–2 in diameter). It has a fibrous, dull brown-green skin and bright green or golden flesh with rows of tiny black edible seeds. The fruit has a soft texture and a unique flavor. It is a commercial crop in several countries, mainly in Italy, China, and New Zealand (Shastri et al.,2012)

CLASSIFICATION

BOTANICAL **ON(Cronquist,
1981)**

Division: Magnoliophyta
Class: Magnoliopsida
Sub Class: Magnoliidae
Order: Ericales
Super Order: Asteranae
Family: Actinidiaceae
Genus: *Actinidia*
Species: *A. deliciosa*
Binomial name: *Actinidia
deliciosa*

GROWTH HABITAT

It is not unusual for a healthy vine to cover an area 10 to 15 feet wide, 18 to 24 feet long and 9 to 12 feet high. In cultivation it is supported on a trellising system. *Actinidia deliciosa* is borne on a vigorous, woody, twining vine or climbing shrub reaching 9 m. (Shastri et al.,2012)

MORPHOLOGICAL DESCRIPTION (Shastri et al.,2012)

Foliage: The large, deep green, leathery leaves are oval to nearly circular. Its leaves are alternate, long-petioled, deciduous, oval to nearly circular, cordate at the base, 7.5-12.5 cm long.

Flowers: The flowers are fragrant, dioecious or bisexual, borne singly or in 3's in the leaf axils, are 5- to 6-petaled, white at first, changing to buff-yellow, 2.5-5 cm broad.

Fruit: The oval, ovoid or oblong fruit is up to 2-2½ inches long, with russet-brown skin densely covered with short, stiff brown hairs



Actinidia deliciosa leaves



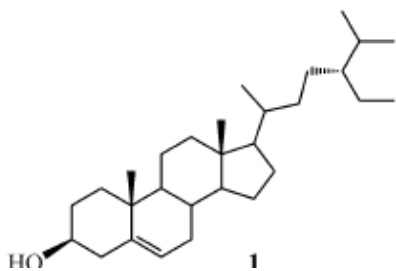
Actinidia deliciosa flower



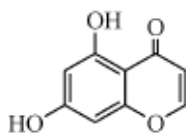
Actinidia deliciosa fruit

PHYTOCHEMISTRY (Shastri et al.,2012)

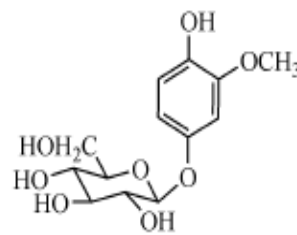
Twelve compounds have been isolated from the root of *A. deliciosa*, and identified as (1) β -sitosterol (2) n-stearic acid (3) isoscopoletin (4) 2, 2-dimethyl-6-chromancarboxylic acid (5) fraxetin (6) aesculetin (7) umbelliferone (8) vanillic acid, (9) protocatechuic acid (10) vanillic acid 4-O- β -D-glucopyranoside (11) 5, 7-dihydroxychromone, and (12) tachioside.



Beta-sitosterol



5,7-Dihydroxychromone



Tachioside

NUTRITIONAL VALUE OF *ACTINIDIA DELICIOSA* (Shastri et al.,2012)

Nutritional value per 100 g

Energy	255 kJ (61 kcal)
Carbohydrates	14.66 g
Sugars	8.99 g
Dietary fiber	3.0 g
Fat	0.52 g
Protein	1.14 g
- lutein and zeaxanthin	122 µg
Thiamine (Vitamin B1)	0.027 mg
Riboflavin (Vitamin B2)	0.025 mg
Niacin (Vitamin B3)	0.341 mg
Vitamin B6	0.63 mg
Folate (Vitamin B9)	25 µg
Vitamin C	92.7 mg
Vitamin E	1.5 mg
Vitamin K	40.3 µg
Calcium	34 mg
Iron	0.31 mg
Magnesium	17 mg
Phosphorus	34 mg
Potassium	312 mg
Sodium	3 mg
Zinc	0.14 mg

HEALTH BENEFITS OF KIWI FRUIT:

Kiwifruit is a good source of several vitamins, minerals and fibre and contains phytochemicals making it a suitable candidate as a fruit based functional food or ingredients(Ferguson et al.,2003).It also contains vitamin K,E folate The minerals K, Mg and Cu as well as dietary fibre(2%-3%) and phytochemicals including carotenoids and polyphenols are also present in Kiwifruit .Kiwifruit is known to contain approximately 2% to 3% dietary fiber, and is purported to possess laxative properties.(Ferguson et al.,2003)Adhesion and aggregation of platelets at the site of injury in atherosclerotic blood

vessel walls are key factors in the pathogenesis of Cardiovascular disease(CVD) (**Duttaroy et al.,2004**). Kiwi fruit extract was shown to stimulate phagocytosis and enhance serum IgA,IgG,IgM . It is currently accepted that the consumption of kiwifruits has a preventive effect against certain cancer and vascular diseases .A diet rich in kiwifruit has a positive effect on the metabolism of lipids and on plasma Triglyceride level and limits the negative impact on exogenous cholesterol (**Leontowicz et al.,2013**)

AIMS AND OBJECTIVES OF THIS STUDY;

From previous review of literature it has been found that it contains a variety of flavonoids ,phenolic compounds and carotenoids that have demonstrated antioxidant activity, these phytonutrients in kiwi may be responsible for this DNA protection. So this study was chosen to examine the quantitative analysis of some antioxidant as well as antinutritional factors .

The objective of the study is to determine:

- The total flavonoid content of kiwifruit using Aluminium chloride colorimetric method.
- The total phenol content of kiwifruit using Folin Ciocalteu method
- DPPH scavenging activity of kiwifruit
- The phytic acid content of kiwifruit
- Alkaloid content of kiwifruit.

MATERIALS AND METHODS:

Material: The Kiwifruits (*Actinidia deliciosa*) without skin ,was taken for this study.

Collection of Sample: The sample was collected from South City Spencer's ,Kolkata. It is mainly imported from outside of the country.

With the sample the following parameters were estimated:

- Estimation of Total flavonoid by **Chang et al.,2002** method
- Estimation of Total Phenol by **Barman K.,2004** method
- DPPH Antioxidant assay by **Mensor et al.,2001** method
- Estimation of Phytic acid by **Wheeler et al.,1971** method
- Estimation of Total Alkaloid by **Harborne,1973** method

RESULT AND DISCUSSION:

Amounts of Total flavonoids, Total phenol, Free radical scavenging activity of DPPH, Phytic acid and Alkaloid content of kiwifruit/100gm whole fruit

PARAMETERS	AMOUNT/100 gms
Flavonoids	6.25mgQuercetin eq
Total phenol	8.8mg Gallic acid eq
DPPH	IC50 -100 mg/ml
Phytic acid	0.151gm
Alkaloid	0.6gm

DISCUSSION:

The analytical study confirmed the massive presence of phenolic substances .The phenol content expressed as gallic acid equivalents(GAE mg/100gm)was 8.8,though some amount of phenol may be reduced due to the preservation process and climate differences. The flavonoid was extracted in methanol and the concentration was found to be about 6.25 mg Quercetin eq/100gm. The results of the DPPH radical assay showed that the extract scavenged massively the radical target species .The antioxidant efficacy of the extract 100mg dose was comparable to that exerted by ascorbic acid 15 mg average dose which concludes that the kiwifruit pulp extracts carried on weak reducing and scavenging capabilities .These antioxidant constituents may contribute to the strong anti oxidative effects of kiwifruits suggesting the additive and synergistic effects of these factors.

Some anti nutritional factors was also measured .The total alkaloid content of kiwifruit was determined and was about 0.6 ± 0.04 gm/100gm.This amount may not interfere any metabolic processes .Previous study have been shown that 1-methyl-1,2,3,4-tetrahydro-beta-carboline may appear in kiwifruits which might act as a antioxidants when absorbed and accumulated in the body. The Phyte content of green kiwifruit was 0.151gm/100gm.But the amount present in kiwifruit may not chelate with much more amounts of minerals.

CONCLUSION

The observed high antioxidant and radical scavenging capabilities define kiwifruit as precious cocktail of protective phytochemicals. Phytochemicals such as those present in

kiwifruit, including carotenoids and polyphenols may contribute to health and wellness by protecting from degenerative diseases and processes associated with ageing. Apart from these antioxidants phytate and alkaloids are also present in such amount that may not create adverse effect being an antinutritional factor. So after assessing its antioxidant and anti nutritional properties the present study proposes that daily consumption of kiwifruit is effective in decreasing the oxidative stress and its related diseases.

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