



Nutritional composition and potential health benefits of Kiwifruit (*Actinidia deliciosa*): A review

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Abstract:

The present review highlights overall nutritional composition as well as major health benefits associated for its better utilization in Indian food industries. Kiwifruit is scientifically known as *Actinidia deliciosa*, native to Asia (majorly central or eastern China) is popular worldwide due to valuable nutritional and sensorial properties. Being the richest source of fruit sugars, vitamins, minerals and other valuable bioactive compounds, it is highly researched on throughout the world. Kiwifruit is known to work well against digestive issues, cardiovascular diseases, skin health, diabetes, inflammation and microbial action etc. which makes it well suited for therapeutic interventions as well as food applications.

Key words: Kiwifruit, nutritional, health benefits, food applications, digestive, skin health.

Introduction:

Fruits are the mature, ripened ovary (reproductive part of plant) which is therefore consumed as a whole. Fruits are an integral part of the daily human diet with 3-5 servings per day as fruits provide wide range of vitamins, minerals, fiber and phytochemicals (Khalid *et al.*, 2011). Fruits contain small quantities of macromolecules such as protein or fats but are largely flushed with vitamins, minerals and sugars which make them as valuable as other plant produced species. Among all the climacteric and non climacteric fruits available, one of the most nutrient dense fruit is Kiwi (*Actinidia deliciosa*). Kiwifruit belongs to family *Actinidiaceae* and genus *Actinidia* which has 76 species and approximately 125 known taxa (Ma *et al.*, 2019). Most commonly available species are *Actinidia deliciosa* (fuzzy or green kiwifruit) and *Actinidia chinensis* (golden kiwifruit) which are grown commercially (Wani *et al.*, 2017; Ishida *et al.*, 2021). Though green and gold kiwifruit differ greatly in color, texture, and taste (Ishida *et al.*, 2021). Kiwifruit is native to central or

eastern China (Dwivedi et al., 2021) which derives its name from native flightless bird. It is also known as Makaku Peach Mihautau or Chinese gooseberry. The plant itself is deciduous vine that grows 9 feet in height and grows well in shade as well as in full sunlight (Tyagi *et al.*, 2015). Plant can be found at a height of 800 to 1500 m with average rainfall of 150 cm/ year. Kiwifruit grows well in deep well drained sandy loamy soil with pH range of 6.9 to 7.3 with minimum of irrigation required after 10 to 15 days. Fruit is small in size approximately 3 inches long, with hairy skin (brown colored) and green fleshy mesocarp along with full of small black edible seeds of kiwi with sweet and tangy flavors (Dwivedi *et al.*, 2021). It is thought to be originally cultivated in the mountainous and forested areas of China. Kiwifruit are a nutrient-dense fruit found full of Phytonutrients, minerals and some valuable vitamins which boost up the health of an individual (Stonehouse *et al.*, 2013). It is exceptionally rich in sugars (glucose and fructose), vitamin C (420mg/100g), vitamin A, E, K, fibre, flavonoids, antioxidants (beta-carotene, xanthin and lutein) and minerals (potassium as 312 mg/100g, zinc, selenium, magnesium, iron, copper) for which its use is tremendously increasing as they provide functional and metabolic benefits. Kiwifruits has several other properties too including its laxative activity, digestive properties, cardiovascular protective properties, ant diabetic properties, anti-inflammatory properties and antimicrobial activities (Ma *et al.*, 2019). Kiwi fruit is involved in production of dried kiwifruit, jams, jellies, marmalades, RTS juices, nectars and many more. Therefore the present review focuses on the nutritional profiling and major health benefits of Kiwifruit (*Actinidia deliciosa*).

Nutritional profile:

Kiwifruit is found to be rich in carbohydrates majorly; fructose and glucose, Proteins, higher moisture content providing 60 to 70 kcal per 100g of the edible portion. Also rich in vitamin B complexes such as B1, B2, B3, B5, B6 and B7, vitamin C, vitamin A, vitamin E and K as well. Many minerals are also been extracted such as iron, magnesium, phosphorous, potassium, sodium, zinc and selenium which makes it highly valuable fruit species.

Table 1) General nutritional composition of Kiwi (*Actinidia deliciosa*) per 100 g

Sr. No.	Nutrient	Composition	Sources
1	Carbohydrates	17.5 g	Dwivedi et al., 2021
2	Proteins	0.79 g	
3	Fats	0.07 g	Richardson et al., 2018
4	Moisture	81.2 g	
5	Calories	60- 66 Kcal	Tyagi et al., 2015
	Vitamins		
1	Vitamin B1(Thiamine)	0.027mg	
2	Vitamin B2 (Riboflavin)	0.025 mg	
3	Vitamin B3 (Niacin)	0.341 mg	
4	Vitamin B5 (Pantothenic acid)	0.183 mg	
5	Vitamin B6 (Pyridoxine)	0.063 mg	
6	Vitamin C (Ascorbic)	92.7 mg	
7	Vitamin A (Retinols)	87 IU	
8	Vitamin E (Tocopherol)	1.47 mg	
9	Vitamin K (Quinones)	40.3 µg	
	Minerals		
1	Calcium (Ca)	34 mg	
2	Iron (Fe)	0.31mg	
3	Magnesium (Mg)	17mg	
4	Phosphorous (P)	34mg	
5	Zinc (Zn)	0.14mg	
6	Copper (Cu)	0.13mg	

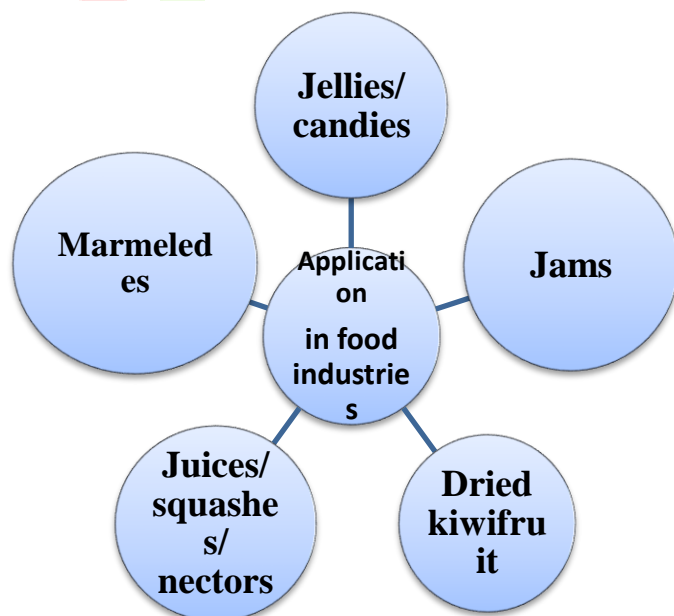
Major health benefits:

Studies have revealed the several health benefits of Kiwifruit which makes it a potent source to be utilized in food as well as pharmacological industries. Kiwi Fruit must be incorporated in daily intake, as the entire fruit after even removing the skin is edible including seeds too (Dwivedi *et al.*, 2021) Major health and nutritional benefits of kiwi fruit are aiding digestion, skin health, cardio protective functions, blood clotting, laxative properties, improves hair health etc.

- Digestive properties:** Kiwifruit comprises higher amount of proteolytic enzyme “actinidin” which increases the digestion of proteins and facilitates smooth movement of food through the digestive system (Tyagi *et al.*, 2015; dwivedi *et al.*, 2021)

- 2. **Cardio protective properties:** Kiwi fruit is reported to have anti-platelets factor which prevents the over functioning of platelets (major reason of CVD's). Also kiwi fruit is rich in fiber content which helps to reduce Cholesterol level of blood and prevents heart disease (Richardson *et al.*, 2018). Also contains protective polyphenols, vitamin C, vitamin E and potassium aids reduction of triglycerides in the blood (due to low sodium and high potassium).
- 3. **Blood clotting and absorption of vitamin D:** Vitamin K of fruit helps with blood clotting and absorption of vitamin D (Tyagi *et al.*, 2015). Due to the higher content of amino acid (arginine and glutamate), improves blood flow and acts in vasodilatation (dilation of blood vessels) and helps in blood clot reduction.
- 4. **Laxative properties:** A clinical study conducted to investigate the laxative effects of kiwifruit on people above the age of 60, who experience constipation and difficulty in passing stools. The results confirmed the laxative properties of kiwi fruit produce a looser or softer stool and greater bulk (Ishida *et al.*, 2021).
- 5. **Hair health:** For retaining the moisture content and preventing the loss of moisture, kiwi fruit is found to be rich in omega3 fatty acid which improves hair health. Studies have shown that premature graying of hair is inhibited by the presence of copper in kiwi fruit. Vitamin C of fruit retards hair fall (Dwivedi *et al.*, 2021).

6. **Application of Kiwifruit (*Actinidia deliciosa*) in food industries:**



Conclusion and future prospective:

This review highlights the nutritional attributes and health benefits of kiwifruit. The nutritional composition, particularly the high amount of vitamin C, supports its position as a highly nutritious, low energy fruit. With the plethora of man-made, processed health foods available to the consumer, one aspect that sets kiwifruit apart is that it is a natural, whole food. Nature compartmentalizes many bioactive and nutritional components within the complex structure of cell walls, cells and the matrix in between. Human digestion interacts with fresh whole foods to break down the structures and digests the complex carbohydrates slowly. Many health care professionals now recognize whole foods are ideal for the release and delivery of nutrients and health components to various locations along our digestive tract. There is a growing body of evidence to support the beneficial effects of kiwifruit in gastrointestinal function in healthy individuals as well as in individuals with constipation and other gastrointestinal disorders, and recognition for the role of kiwifruit in their management. Kiwifruit has also been proven to provide various cardio-protective functions, laxative properties, good hair health, vitamin D absorption and blood clotting functions. This presents an evidence-based opportunity for health care professionals to adopt dietary recommendations, and for consumers to recognize the impact of diet, in particular whole foods, on specific body function, and their health and well-being.

Overall, the scientific evidence for the health benefits of kiwifruit needs to be expanded through the conduct of well-designed and executed human intervention studies that clearly define the study populations, the amount and duration of kiwifruit consumption and the specific beneficial physiological effects. A greater understanding of the mechanisms of action of kiwifruit and its bioactive constituents in promoting health also needs to be fully elucidated. The increased research data identifying the nutritional and health benefits of kiwifruit and their growing consumer acceptance as a part of a balanced diet, will undoubtedly offer opportunities to tackle some of the major health and wellness concerns around the world.

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