

A Review on Biological and Nutritional Value of Kiwi Fruit

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ABSTRACT

Kiwifruit, scientifically known as *Actinidia deliciosa*, stands out as a nutritional powerhouse among fruits, belonging to the family Actinidiaceae. Renowned for its exceptional nutrient density, the kiwi offers a remarkable blend of health-enhancing compounds that contribute to its unique status in the realm of fruits.

What distinguishes kiwifruit is its unparalleled concentration of vitamin C, surpassing even citrus fruits. A single medium-sized kiwi contains more than the recommended daily intake of this crucial antioxidant, known for bolstering the immune system, aiding collagen synthesis, and promoting skin health.

Furthermore, the kiwifruit boasts an abundance of dietary fiber, which aids digestion and helps regulate blood sugar levels. Its notable potassium content supports heart health by regulating blood pressure, while other essential minerals like magnesium and copper contribute to various bodily functions. What sets kiwifruit apart is its rich array of phytochemicals and antioxidants, such as flavonoids and carotenoids, which combat oxidative stress, reduce inflammation, and potentially lower the risk of chronic diseases like heart disease and certain cancers.

Interestingly, kiwifruit contains actinidain, an enzyme that aids in protein digestion, making it particularly beneficial for individuals seeking improved digestive health. Moreover, its low glycemic index makes it a favorable choice for those managing blood sugar levels. The unique combination of nutrients, antioxidants, and digestive enzymes in kiwifruit not only distinguishes it as a delicious and refreshing addition to the daily diet but also positions it as a standout contender among fruits in promoting overall health and well-being.

Keywords: Kiwi Fruit, Chemical Composition, Phytochemicals and Nutritional Value.

I. INTRODUCTION

Kiwifruit, revered for its diverse medicinal properties, has surged in popularity over the last two decades. Known as the Macaque peach or Mihoutau, it earned its name from New Zealand, though it originates from China's Chang Kiang valley. Initially introduced to Asia as an ornamental vine in the early 1900s, this vigorous deciduous climber thrives in heights up to 9 meters, adapting well to full sun or semi-shaded environments in mountainous regions.

Belonging to the Actinidiaceae family, with species like *Actinidia deliciosa* (fuzzy or green kiwifruit) and *Actinidia chinensis* (golden kiwifruit) dominating commercial cultivation, kiwifruit boasts exceptional nutritional value. Laden with high levels of vitamin C and a potent mix of antioxidants—carotenoids, lutein, phenolics, flavonoids, and chlorophyll—it stands out for its rich vitamin E content, along with fructose, galactose, and an array of minerals. Moreover, the presence of iso-flavones and flavonoids, prominent phytochemicals in kiwi extract, showcases significant anti-carcinogenic, neuro-protective, and cardio-protective properties.

Traditionally employed in medicine to alleviate various symptoms, kiwi fruit's potential benefits extend to being a robust source of antioxidants, aiding gastrointestinal health, regulating blood lipid levels, and soothing skin conditions. However, it's essential to note that some individuals report allergic reactions to kiwi fruit, prompting ongoing research to understand its allergenicity among diverse populations.

Beyond its renowned vitamin C content, kiwifruit stands out for its wealth of nutrients such as folate, potassium, and dietary fiber. The amalgamation of nutrients and biologically active phytochemicals within kiwi has spurred investigations into its antioxidant and anti-inflammatory actions. These

properties, in turn, hold promise for averting cardiovascular diseases, cancer, and other degenerative disorders.

Pharmacognosy of kiwi fruit

The *Actinidia* genus, belonging to the Actinidiaceae family within the Ericales order and Magnoliopsida class, represents a diverse array of dozens of species, among which *Actinidia deliciosa*, commonly known as the green kiwi, reigns supreme in commercial cultivation. However, the market also embraces variations like *Actinidia chinensis* (yellow kiwi), *Actinidia Kolomikta*, and *Actinidia arguta* (baby kiwi), each contributing distinct qualities to the fruit's spectrum. This robust, deciduous climber ascends to approximately 9 meters, thriving in both full sun and partial shade. Characterized by a brown, fuzzy peel and green flesh housing white, seed-speckled pulp, typically 3 inches long, the kiwi is not only relished fresh but also transformed into dried, frozen, or processed forms such as jams, jellies, marmalades, and juices. Renowned in some cultures for its meat-tenderizing properties, kiwifruit encompasses an abundance of phytonutrients, essential vitamins (A, E, K), and minerals. Rich in glucose and fructose with traces of sucrose, it boasts notable levels of antioxidants like beta-carotene, lutein, and xanthin, promoting overall health and well-being.



Actinidia deliciosa

Actinidia arguta



Actinidia malanandra

Actinidia kolomikta



Fig 1 :- Species of kiwi fruit

Collection and cultivation method of kiwi fruit

Origin :

The Kiwi fruit, scientifically known as *Actinidia deliciosa* or Chinese Gooseberry, traces its roots to the mountainous terrains of Southwestern China, where it thrives as a natural deciduous fruiting vine. In 1940, New Zealand saw a modest 400 hectares dedicated to commercial Kiwi cultivation, yielding approximately 2100 tonnes of fruit. However, since that time, a remarkable transformation has occurred, marked by a consistent surge in plantation size and fruit production. Presently, the Kiwi fruit industry stands as a beacon of success in New Zealand, having evolved into a global powerhouse. This remarkable growth not only reflects the fruit's journey from its Chinese origins but also showcases New Zealand's prowess in cultivating and commercializing this unique, flavorful fruit. The country's specialized techniques, coupled with favorable climate conditions, have propelled Kiwi fruit cultivation to unprecedented levels, positioning New Zealand as the unrivaled leader in the world of Kiwi production and trade.

Adaptability:

The resilient Kiwi fruit vine thrives within the altitudes of 900 to 1600 meters above sea level, reveling in warm, humid climates. Its adaptability extends to regions like Jammu and Kashmir, Himachal Pradesh, Assam, Meghalaya, Nagaland, Mizoram, and the hilly terrains of Tripura. While moderate to high rainfall fosters its growth, the plant faces vulnerability to strong winds and frost during its crucial developmental stages. A rainfall averaging 150 cm proves ample for fostering Kiwi fruit cultivation. Yet,

caution must be exercised as excessive summer temperatures surpassing 35°C can lead to fruit injury due to sunburn. The Kiwi vine flourishes best in deep, crumbly sandy loam soil, provided with efficient drainage and supplemented irrigation—a combination that propels its fruitful growth.

Precocity and High Yields:

Remarkably, the Kiwi fruit exhibits its bounty at a remarkably tender age, often yielding substantial crops as early as 4 to 5 years after planting. In the nurturing environs of Himachal Pradesh, a single plant typically offers a harvest ranging between 50 to 80 kilograms of fruit. Impressively, the Kiwi crop boasts a notable absence of failures, standing out as a resilient produce that consistently delivers.

Marketability

With its ripening cycle spanning from October to December, the Kiwi fruit strategically fills a seasonal void in the Indian market, coinciding with a lean period for many other fruits. Notably hardy, Kiwis boast an advantage for transportation over long distances sans intricate packaging requirements. Their robust nature allows for storage at room temperature for up to a month, while cold storage at 0 degrees extends their shelf life to an impressive 4 to 5 months. This extended preservation capability facilitates a prolonged supply to the market, preventing any sudden oversupply and ensuring a steady availability for consumers.

Planting and Pollination:

In the realm of vine cultivation, the meticulous artistry of the T-Bar training system serves as a guiding framework, where vines are carefully nurtured and shaped for optimal growth. The genesis of this journey unfolds during the waning days of winter or the gentle awakening of early spring. Each vine, bestowed with its own space, rests in a calculated expanse of 6 meters by 4 meters, allowing ample room for its individuality to flourish. A distinctive characteristic of these vines

lies in their gendered floral ensemble – male and female flowers grace separate plants, weaving a botanical tapestry of uniqueness. To orchestrate nature's symphony and ensure fruitfulness, a harmonious ratio is maintained: for every nine female plants, one stalwart male stands sentinel, fostering the delicate dance of pollination. The significance of insect pollinators emerges as custodians of this ritual, their presence a vital cog ensuring the fruition of marketable fruits. Patience becomes a virtue in this verdant saga, as the initial flourish of flowering emerges after the passage of 2-3 years from planting. Yet, it is not until the passage of 4-5 years that the vine's true bounty reveals itself in substantial yields, a testament to the gradual crescendo of nature's transformative work in the vineyard's embrace. Thus, in this choreography of time, space, and natural rhythms, the T-Bar-trained vines burgeon forth, bearing the promise of abundant harvests and the culmination of a patient, nurturing journey.

Nutrition:

To nurture a flourishing vineyard, a meticulous approach to fertilization is indispensable. Embracing a strategy of sustainable enrichment, 20 kilograms of Farmyard Manure (FYM) in tandem with 0.5 kilograms of NPK fertilizer is artfully employed. Harnessing the inherent richness of moisture infused with 15% nitrogen, a choreographed application unfolds in two acts annually. As January's embrace enwraps the vine, a measured libation commences—half of the FYM dutifully laid at its roots, harmonized by a calculated 0.25 kilograms of NPK fertilizer. In the following month of February, the vine is again adorned with nature's offering—the remaining portion of the FYM envelops the earth around, accompanied by a symphony of 0.25 kilograms of the fertilizer blend. This nurturing ritual, an ode to sustainable growth, continues its verse post the vine's fruit-bearing revelation in April-May. Here, the balance of nutrients, a testament to attentive care, is meticulously bestowed upon the vine, tailoring the

sustenance to its burgeoning needs. Thus, a bespoke rhythm, woven from natural elements and mindful tending, ensures the vine's vigor and the promise of bountiful harvests.

Irrigation

In the delicate genesis of a Kiwi fruit orchard, irrigation stands as the cornerstone for nurturing the nascent vines during their formative years, a pivotal key to unlock their full potential. These initial years, spanning the tender phase of 2-3 years post-planting, demand a careful orchestration of water, aligning with the vine's thirst to establish deep roots and robust growth. Yet, as time orchestrates its verdant symphony, a captivating transformation unfolds. The once-budding vines, now adorned in a lush tapestry of foliage, undergo a metamorphosis, their verdant canopy unfurling to envelop the earth below. This verdant embrace serves as nature's own mulch, gracefully veiling the soil and orchestrating a symphony of microclimates. In this symbiotic ballet, the foliage choreographs a performance that bespeaks of self-sufficiency, weaving a tapestry that diminishes the vineyard's reliance on excessive irrigation. Gradually, the cadence of watering diminishes, mirroring the harmony of a well-timed crescendo as the foliage takes on the role of a natural shield, sheltering the soil and its inhabitants from the harsh sun's embrace. Thus, from the initial dependence on meticulous irrigation to the empowering cover of foliage acting as both guardian and mulch, the Kiwi orchard's journey epitomizes nature's waltz, a saga of symbiosis and gradual self-sustainability.

Maturity and Harvesting

In the art of cultivating premium-quality fruits, timing stands as the maestro orchestrating the symphony of taste, longevity, and storage prowess. The pinnacle of excellence for the harvest of these fruits arrives at a precise moment: when they reach a coveted threshold of at least 6.2 Total Soluble Solids (T.SS) while maintaining their steadfast hardness. This convergence

of sweetness and resilience signifies the zenith of flavor and the promise of extended storage life. However, the conductor of this virtuoso performance is time itself. A delay in this carefully timed harvest strikes a dissonant chord, unraveling the symphony of storability. With each passing moment beyond this optimal window, the fruits undergo a subtle transformation, edging away from their peak, inching towards a decline in their potential for prolonged storage. Hence, the narrative of these fruits weaves a tale where precision in harvesting stands as the linchpin for securing not only their premium quality but also unlocking their ability to withstand the passage of time, preserving their essence for the discerning palate. In this delicate balance between ripeness and resilience lies the secret to unlocking the full spectrum of flavor and ensuring an extended encore in the storerooms of freshness and taste.



Fig 2 : Maturity and cultivation

Chemical constituents of kiwi

Nutritional component	Value
Energy	61kcl
Protein	1.14g
Total lipid(fat)	0.52g
Calcium	34mg
Iron	0.31mg
Magnesium	17mg
Phosphorus	34mg

Potassium	312mg
Sodium	3mg
Zinc	0.14mg
Copper	0.13mg
Vitamin A	4ug
Vitamin E	1.46mg
Folate	25ug
Choline	7.8mg
Betaine	0.5mg
Tocotrienol	0.1mg
Vitamin k	40.3ug
Vitamin C	92.7mg
Thiamin	0.027mg
Riboflavin	0.025mg
Vitamin B3	0.341mg
Vitamin B5	0.183mg
Vitamin B6	0.063mg
Selenium	0.2ug
Carbohydrate	14.7g
Total dietary Fiber	3g
Total sugar	8.99g
Leucin	0.066g
Lysine	0.061g
Glutamic acid	0.184mg
Phenylalanine	0.044g
Aspartic acid	0.126
Fatty acid saturated	0.029g
Fatty acid monounsaturated	0.047g
Fatty acid polyunsaturated	0.287g
Tryptophan	0.015g
Proline	0.045g
Glycine	0.06g
Valine	0.057g
Cystine	0.031g
Tyrosine	0.034g

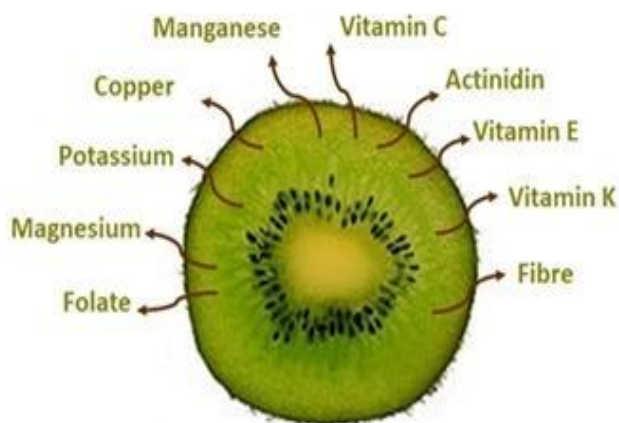


Fig 3 : Chemical constituent of kiwi

Properties of kiwi Fruit :

Some potential properties of kiwi fruit are listed below :

- It may act as an anti-hypertensive.
- It may have a diuretic potential.
- It may act as an anti-hepatotoxic agent.
- It may act as a mild laxative.
- It may act as an anti-oxidant.
- It may have an anti-cancer potential.
- It may be an anti-asthmatic.
- It may act have anti-platelet and anti-thrombin (prevents blood clots) properties.
- It may be an anti-nociceptive(Prevent the pain sensation).
- It may have an anti-atherosclerotic potential.
- It may have an anti-hypercholesterolaemia property.
- It may have anti-inflammatory property.
- It have anti-diabetic properties.
- It may be a potential anti-pyorrheal agent.
- It may have a dermatologic potential.
- It may act as an angiogenic agent.

Health Benefits of kiwi fruit

1. Revitalizing Scalp Health: The abundant presence of vitamins E and C in kiwi fruit promotes scalp

health, nourishing hair follicles and fostering an environment for healthy hair growth.

2. Natural Shine Booster: Enriched with antioxidants, kiwi fruit extract serves as a natural shine enhancer, giving hair a lustrous and radiant appearance.
3. Strengthening Hair Strands: The high content of vitamin C in kiwi aids in collagen production, strengthening hair strands from within, reducing breakage, and enhancing overall hair resilience.
4. Hydrating and Moisturizing: Kiwi's hydrating properties assist in maintaining hair moisture, preventing dryness, and contributing to softer, more manageable hair.
5. Combatting Dandruff: The anti-inflammatory properties of kiwi fruit soothe the scalp and may help alleviate dandruff concerns, contributing to a healthier scalp environment.
6. Natural Hair Growth Stimulant: Kiwi's nutrient-rich profile, including minerals like zinc and magnesium, may encourage healthy hair growth, promoting fuller and thicker locks.
7. UV Protection for Hair: The antioxidants present in kiwi fruit offer potential protection against UV damage, shielding hair from environmental stressors that may lead to hair damage or color fading.
8. Balancing Oil Production: Kiwi's pH-balancing qualities help regulate oil production on the scalp, maintaining a healthy balance and reducing the risk of greasy hair.
9. Enhancing Hair Texture: Regular use of kiwi-infused hair products or natural extracts may contribute to improved hair texture, making it smoother and more manageable.
10. Restorative Hair Treatment: Utilizing kiwi as a part of hair masks or treatments can provide

restorative benefits, revitalizing dull and damaged hair, and promoting overall hair health.

Side effect of kiwi fruit

- Allergy
- Acute pancreatitis
- Blood Thinners
- Kidney problems
- Beta Blocker
- Anaphylaxis
- Asthma
- Rash
- Dermatitis
- Hives
- Vomiting
- Nausea
- Diarrhoea
- Acute pancreatitis

Drug interaction

1. **Unforeseen Interactions with Anti-Fungal Medications:** While renowned for its anti-fungal properties, kiwi fruit may unexpectedly interact with certain anti-fungal medications, potentially amplifying their effects and leading to unforeseen consequences. Caution is advised when combining kiwi with such medications due to potential additive effects that might alter their intended outcomes.
2. **Enhanced Bleeding Risks in Conjunction with Specific Drugs:** When consumed alongside particular medications, kiwi fruit can heighten the risk of bleeding due to its impact on blood clotting. This interplay emphasizes the importance of mindful consumption, especially when taking medications that affect blood clotting processes, warranting close monitoring and medical guidance.
3. **Serotonin Levels and Kiwi Interaction:** The consumption of kiwi fruit might exhibit a synergistic effect on serotonin levels in the body, potentially influencing mood and certain

neurological functions. Understanding this interplay is crucial, especially for individuals on medications that impact serotonin levels, to avoid any unexpected alterations in bodily responses.

4. **Impact on Bleeding Disorders:** Kiwi's potential to slow down the blood clotting process can exacerbate existing bleeding disorders. Individuals with such conditions should be cautious when consuming kiwi, as it might intensify their conditions, leading to increased bleeding risks.
5. **Safe Consumption for Pregnant and Breastfeeding Individuals:** In moderate amounts as part of a regular diet, kiwi is generally considered safe for pregnant and breastfeeding women. However, careful monitoring and moderation are advised to avoid any adverse effects, especially in cases of specific health conditions or allergic reactions.
6. **Lack of Clear Dosage Guidelines:** Determining appropriate kiwi fruit dosages remains a challenge due to the lack of comprehensive scientific information regarding age-specific or condition-specific recommendations. Tailoring consumption based on individual health conditions and seeking professional advice is prudent to ensure safe intake.

II. CONCLUSION

The nutritional richness and potent antioxidant properties of kiwi fruit make it an ideal addition to our daily culinary repertoire. Its versatility allows for seamless integration into various beverages and everyday dishes, amplifying both flavor and nutritional content. Beyond its exquisite taste, the multitude of health benefits attributed to kiwi, including its potential in disease prevention, further accentuates its significance in promoting overall well-being. Incorporating kiwi into our diets not only enhances the taste of our meals but

also offers a natural shield against ailments, epitomizing its status as a wholesome and beneficial dietary staple.

III. REFERENCES

- [1]. Duttaroy, A. K.; Jorgensen, A. (2004): Effects of kiwifruit consumption on platelet aggregation and plasma lipids in healthy human volunteers. *Platelets*, 15: 287-292.
- [2]. Khalid, Uzma & Nosheen, Farhana & Raza, Muhammad Asif & Ishaque, M & Ahmad, Muhamad & Rashid, Sajid & Rubab, Farwah. (2011). A Comparative Study about the Daily Intake of Fruits and Vegetables among Female Students of Two Universities of Faisalabad. *Pakistan Journal of Nutrition*. 10. 10.3923/pjn.2011.684.689
- [3]. Ma, T., Lan, T., Geng, T., Ju, Y., Cheng, G., Que, Z., ... Sun, X. (2019). Nutritional properties and biological activities of kiwifruit (*Actinidia*) and kiwifruit products under simulated gastrointestinal in vitro digestion. *Food & Nutrition Research*, 63(0). doi:10.29219/fnr.v63.1674
- [4]. Wani, Sajad & Ahmad, Mukhtar & m, Sa & I, Guroo & Masoodi, F.A. & SA, Wani. (2017). A Review of Production and Processing of Kiwifruit. *Journal of Food Processing & Technology*. 8. 10.4172/2157-7110.1000699.
- [5]. Ishida, F. , Hu, A. , Yamaguchi, T. , Naraoka, Y. and Kobayashi, H. (2021) The Effects of Green Kiwifruit Ingestion on Digestive Health, Blood Flow, Skin Health, and the Autonomic Nervous System. *Health*, 13, 647-659. doi: 10.4236/health.2021.136049
- [6]. Tyagi, S., Nanher, A. H., Kumar, V., Nishad, S. K., Ahmad, M., & Bhamini, K. (2015). Kiwifruit: Health benefits and medicinal importance. *Rashtriya krishi*, 10(2), 98-100
- [7]. Hunter, D.C.; Skinner, M.A.; Ferguson, A.R. and Stevenson, L.M. (2010): Kiwi Fruit and Health. The New Zealand Institute for Plant Journal of Home Economics, Volume 29, Number (2,4), 2019 and Food Research Ltd, Auckland, New Zealand, 2nd Edition, pp.: 565-580.Keith, S. (2012): Kiwifruit Overview
- [8]. Keith, S. (2012): Kiwifruit Overview of Potential Health Benefits. *Nutr. Today*, 47 (3):133-147.
- [9]. Ferguson A, Huang H. Genetic resources of kiwifruit: domestication and breeding. *Horticultural Reviews*. 2007;33:1–121.
- [10]. García JC, García G, Giordia M. Variedades de kiwi. *Technologies agroalimentaria*. 2014;14:2–7.
- [11]. Chaurasia, Madhuri and Gaba, Ritu (2014).Kiwi Fruit:A Fruit or a Medicine. *Res. News For U.*, 17 : 203-204.
- [12]. Maillar, C. (1998). The kiwi, rich in vitamins C and E and also in potassium. *Servir May-1998 Jun 30;46(3):160*. 1998. PMID:13380.
- [13]. Montefiori, M., Mc Ghie, T.K., Costa, G. And Ferguson, A.R. (2005). Pigments in the fruit of redifleshed kiwifruit (*Actinidia chinensis* and *Actinidia deliciosa*). *J. Agric. Food Chem.*, 53 : 9526-9530.
- [14]. Morton, J., Julia F. Morton and Miami, FL. (1987).Fruits of warm climates. *Kiwifruit*. p. 293–300.
- [15]. Motohashi, N. (2002). Cancer prevention and therapy with kiwifruit in chinese folklore medicine: a study of kiwifruit extracts. *J. Ethnopharmacol.*, 81 (3) : 357-364.
- [16]. Sommerburg, O., Keunen, J.E., Bird, A.C. and van Kuijk, F.J. (1998). Fruits and vegetables that are sources for lutein and zeaxanthin: the macular pigment in human eyes. *Br. J. Ophthalmol.*, 82(8) : 907-910.Szeto, Y.T., Tomlinson, B. and Benzie, I.F. (2002).
- [17]. Total antioxidant and ascorbic acid content of fresh fruits and vegetables: implications for dietary planning and food preservation. *Br. J. Nutr.*, 87 : 55-59

- [18]. Megagriculture [Internet]. Kiwi Fruit; [cited 2022 May 20]. Available from: http://megagriculture.gov.in/public/package_of_practice_kiwi.pdf
- [19]. Raman VK, Chauhan SK, Chaudhuri A. Actinidia deliciosa: A Nature's Boon to Modern Pharmacotherapeutics. Appl. Pharm Sci. Microbiol [Internet]. 2020 Oct [cited 2022 May 20];16:83
- [20]. NHS [Internet]. Kiwi fruit allergy; 2020 Sept 9 [cited 2022 May 20].
- [21]. Manohar M, Varma AK, Venkateshaiah SU, Goyal H, Mishra A. Food-induced acute pancreatitis. Dig Dis Sci [Internet]. 2017 Dec [cited 2022 May 20];62(12):3287-97.
- [22]. Stanley R., wergze yn.sal.aeh.Z(2006,february).Kiwi fruit processes product Acta Horticulture

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