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Edible Flowers- New Source for Health Benefits

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Abstract
The demand for aesthetically pleasing and superior quality food is increasing on a daily basis. The growing fascination with functional meals and nutraceuticals has spurred extensive research into novel food options that offer beneficial impacts on human health. Furthermore, we perceive edible flowers as an innovative approach to promoting nutritional well-being. Edible flowers are safe to consume and can enhance the appearance, texture, and freshness of any food. In addition to their appealing qualities, they also have the potential to provide phytochemicals. The health benefits of edible flowers are attributed to a range of phytochemicals, including flavonoids, anthocyanins, carotenoids, and phenolics. It is crucial to have new knowledge about the composition and health advantages of edible flowers, as it represents a significant reason to consume them. However, the short duration of the blooming time or the fact that most of the blooms are harvested by local residents for culinary and medicinal purposes can limit their availability. Although there have been limited efforts to utilise edible flowers, many of their potential applications remain untapped and should be harnessed to achieve food and nutritional security, as well as to increase employment prospects for rural populations. This article includes information on different types of edible flowers, their nutritional and phytochemical composition, the health benefits they offer, their traditional uses, techniques for harvesting and preserving them, incorporating them into functional food products, marketing considerations, and any potential toxicological concerns. This article aims to promote the consumption of edible flowers among consumers and the food industry, highlighting their significant potential as a source of nutraceutical compounds.

Introduction
Flowers have been an essential component of human culture since ancient times and have been described as a marvel of nature and a representation of beauty in literature. These plants are cultivated not only for their ornamental value, but also for their nutritional and biological characteristics, which have been utilised in culinary art for millennia. Edible flowers are included into various regional culinary traditions, such as those found in Asian, European, and Middle Eastern cuisines.

Although the beneficial effects of flowers as a new and favourable source of essential minerals in the human diet should not be disregarded, caution must be used with the presence of anti-nutritional compounds in specific species. Nevertheless, there are a multitude of cultivated and wild species that are cultivated for their edible blooms. The recent focus on gastronomy and the use of flowers as garnishes has also sparked the curiosity of experts over the nutritional benefits of edible flowers.

It was observed that the inclusion of edible flowers could increase the worldwide desire for food that is both visually appealing and tasty. Edible flowers are excellent

reservoirs of nutritional and phytochemical components, and their abundance of antioxidants in the blossoms is particularly thrilling.

Multiple studies have demonstrated that edible flowers exhibit potent therapeutic characteristics, including antidiabetic, anti-cancer, anti-anxiety, anti-inflammatory, antibacterial, diuretic, and immunomodulatory effects. Regrettably, the concept of consuming flowers is still met with skepticism, despite their agricultural potential. Additionally, the majority of edible flowers are gathered from natural resources by indigenous populations in many countries. Improving nutrition education focused on promoting flowers is of utmost importance.

Popular edible flowers

Accurate identification of edible flowers is crucial due to the vast variety of plant species, with only a limited number being suitable for consumption. Various varieties of consumable blossoms are readily accessible in the market, and there is a discernible surge in their popularity. these flowers are consumed in their fresh state, but they can also be consumed in processed forms such cakes, tea, jam, salads, and beverages Additionally, they can be directly utilised as vegetables. Table 1 presents a concise overview of edible flowers and their various applications.

Scientific name	Common name	Family	Origin	Edible use	Medicinal uses
Antirrhinum majus	Dog flower	Scrophulariaceae	Europe, Central America	Flavour	Diuretic, treatment for scurvy and liver disorders
Bauhinia variegata	Orchid tree	Fabaceae	Asia	Vegetable	Anti-diabetic
Bombax ceiba	Silk cotton tree	Bombacaceae	Asia	Vegetable	Flower is used as astringent and good for skin trouble, haemorrhoids
Calendula officinalis	Pot marigold	Asteraceae	South Europe	Tea, cakes and flavour	Wound healing, hepatoprotective, anti-inflammatory, anti-bacterial and anti-fungal, antidiabetic, anti-HIV and anti-cancerous
Clitoria ternatea	Butterfly pea	Fabaceae	Tropical Asia	Dessert and beverages	Brain tonic, anti-depressant, anxiolytic, sedative and anti-convulsant
Dahlia coccinea, and D. campanulata	Wild dahlia	Asteraceae	Mexico	Salad, sweets and cakes decoration	Increase appetite and gastric secretion

Echinacea purpurea	Purple Coneflower	Asteraceae	North America	Fresh and dried petals used in tea	Antioxidant, antidiabetic and antihypertensive
Fuchsia hybrida	Dancing lady	Onagraceae	South America	Tea, cakes and flavour	Relaxant and disinfectant
Gardenia jasminoides	Cape jasmine	Rubiaceae	Asia	Salad, tea	Aepatoprotective, antidepressant, and anti-inflammatory activity
Helianthus tuberosus	Sun flower	Asteraceae	North America	Soup	Antibacterial and antimycotic
Hemerocallis fulva	Day lily	Liliaceae	Asia	Vegetable	Inflammation, indigestion and depression
Hibiscus rosa sinensis	China rose	Malvaceae	Africa	Tea, food supplement	Cough, Fever, genito-urinary troubles
Jaminum sambac	Arabian jasmine	Oleaceae	India or Pakistan	Teas	Cancer, ulceration, uterine bleeding, skin diseases and wound healing
Opuntia ficus indica	Prickly pear	Cactaceae	Mexico	Vegetable	Diuretic and relaxant of renal excretory tract
Rhododendron arboretum	Burans	Ericaceae	India	Squash beverages, preserve etc.	Heart disease, dysentery, diarrhea, detoxifcation, infammation, fever, constipation, bronchitis and asthma
Rosa spp.	Rose	Rosaceae	Northern Hemisphere	Tea, salad, cakes, flavor extracts	Cancer, inflammation, ageing, heart diseases
Tagetes erecta and Tagetes patula	Marigold	Asteraceae	Mexico	Salad and food colorant	Anti-aging, AMD diseases, anti-

					inflammatory, neuroprotective
Viola × wittrockiana	Pansy	Violaceae	Europe	Desserts, soups, beverages, salad or added as garnish	laxative, expectorant, emetic, anti-inflammatory, diuretic, sedative and antiseptic

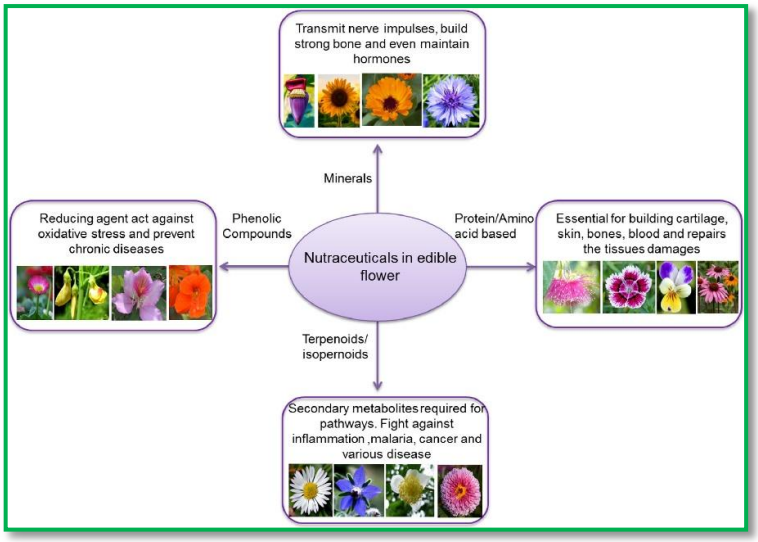
Source: Journal of Functional foods

Health benefits of edible flowers

FLOWER	PARTS USED/ CONSUMED	PHYTOCHEMICALS	HEALTH BENEFITS
Hibiscus Sabdariff	Calyxes, leaves and flowers	Flavonoids, Thiamin, Riboflavin, Ascorbic Acid	Helps in making lower blood pressure, Boost liver health, Packed with antioxidants, could promote weight loss also
Roses (Rosa spp)	Leaves. Root barks, Petals,	Essential oil Flavonoids, Carotenoids, Organic acids, Galactolipids	Acts as a natural coolant, Fights depression, Promotes healthy heart, Anticancer, As a cooling and digested aid
Jasmine Flowers (Jasmine officinale, Jasmine Nudiflorum)	Petals	Coumarins, cardiac glycosides, phenolics, flavonoids, saponins, essential oils,	the steroids Used in eye diseases, ulcers, Acts as antioxidants in body, protects cell against free radical damage, skin related diseases and itching, anti inflammatory, antiseptic properties used in treatment of depression, good for teeth related diseases also
Marigolds (Calendula officinalis)	Petals, leaves	Alkaloids tannins, flavonoids, saponin, terpenoids,	It supports skin healing, contains anti- inflammatory properties, helpful in soothing the mucus membranes of throat,
Lavender flowers (Lavandula)	Leaves, flowers, stems, buds	Terpenoids, saponins, tannins, hydroxycinnamic acids, chlorogenic acids	Improves mood, promote restful sleep, reduce inflammation, eliminate dandruff, soothe stomach bloating, lower skin irradiation

Application of edible flowers

1. In the beverage industry, flowers can be utilised as flavourings for beverages or as ingredients to produce beverages such as tisanes and wines. They are commonly found in condiments such as vinegar, marinades, and sauces, as well as spreads like butter or fruit preserves.



2. Daily meal: Edible flowers are now widely utilised in cooking because of their strong and unique aromas, textures, and colours. They are utilised to increase flavour, fragrance, and visual appeal. They can be included in salads or eaten as part of a main course.
3. In the confectionery industry, edible flowers can be utilised to adorn cookies, cakes, and other baked goods with the aim of enhancing their visual appeal and providing nutritional value.
4. The pharmaceutical sector can utilise certain edible flowers for their medicinal characteristics. The flower's extracts contain phenolic chemicals, which contribute to their antioxidant, antibacterial, and anti-acetylcholinesterase actions. These activities have positive effects on human health .
5. Edible flowers can be utilised as novel food due to their non-toxic nature and nutraceutical characteristics
6. Enhancing food: prepared dishes can be adorned with edible flowers to add visual appeal, as they possess delightful hues, allure, and elegance.
7. Organic food dye
8. Perfume and cosmetic industry

Conclusion

Edible flowers are currently receiving increased recognition in the contemporary era, mostly because of their exceptional nutraceutical capabilities. Edible flowers serve as a valuable reservoir of both nutritional and phytochemical substances. Phenolic acids, carotenoids, and flavonoids, including anthocyanins, are the primary phytochemical substances contained in edible flowers, renowned for their numerous health advantages. Edible flowers have potent medical qualities, including as antidiabetic, anti-cancer, anti-anxiety, anti-inflammatory, antibacterial, hepatoprotective, and neuroprotective effects. The use of edible flowers to create functional foods is growing steadily in the worldwide food and pharmaceutical industry, creating significant opportunities for the growth of the edible flower market. Therefore, the use of edible flowers has created new opportunities to address malnutrition, promote agricultural diversity, generate additional money, and protect endangered wild edible flower species from human activity. This review offers a thorough understanding of several topics concerning edible flowers, making it a helpful resource for scholars involved in the field of edible flowers and their application.

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