Int. J. Adv. Res. Sci. Technol. Volume 3, Issue1, 2014, pp.51-57 # ICV 5.14

IJARST

International Journal of Advanced Research in Science and Technology

journal homepage: www.ijarst.com

ISSN 2319 – 1783 (Print)

ISSN 2320 – 1126 (Online)

Edible flowers – A Review article

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A R T I C L E I N F O

Article history:

Received 17 Apr. 2014

Accepted 17 Jun. 2014

Available online 22 Jun. 2014

Keywords:

Edible flower,
Nutritional values,
Minerals and Vitamins.

A B S T R A C T

On a global scale, people are demanding more attractive and tasty food. Both the quality of foodstuffs and aesthetic aspects contribute to the appearance of consumed meals. The attraction and appeal of individual dishes could be enhanced by edible flowers. Globalization has contributed not only to a better awareness of consumers but also to the comeback of earlier lifestyles, in which edible flowers played an important role. New information concerning the composition and nutritional value of edible flower is also important and represents a sufficient reason for their consumption. The aim of the article is to contribute popularization of edible flowers.

Introduction:

Edible flowers, which have been used in the culinary arts for centuries, are experiencing renewed popularity. Flowers can serve as an essential ingredient in a recipe, provide seasoning to a dish, or simply be used as a garnish. Flowers are part of many regional cuisines, including Asian, European, and Middle Eastern cuisines. The ancient Romans cultivated roses, violets, and borage for culinary use. Today, edible flowers are a popular way to add colour, texture, scent, and flavour to foods. Following is a list of some edible flowers, their culture, and suggested uses.

Is there any Benefits:

Flowers are rich in nectar and pollen and studies have shown pollen to be nutritious with vitamins and minerals. Flowers are 95 percent water so it is unlikely that they contain significant amounts of nutrition. So while blossoms add visual delight, pleasing aroma and delightful taste, one thing they do not add is calories. Limited reviews indicated that they are nearly calorie free. The following are the list of some edible flowers and their benefits.

Is there any previous history:

It is surprising how many flowers growing in our gardens are edible. For centuries edible flowers have been an integral part of human nutrition and were already described in detail in ancient literature. The culinary use of flowers dates back thousands of years with the first recorded mention being in 140 B.C. Dandelions were one of the bitter herbs referred to in the Old Testament of the Bible. Many different cultures have incorporated flowers into their traditional foods. The Chinese were the first to experiment with flowers as food and their many and varied recipes can be traced back as far back as 3,000 B.C. In Roman times, the edible flowers of pinks, violets and roses were used in dishes and lavender in sauces. Gardeners and cooks over 1000 years ago were already using pot marigolds and orange blossom in their cooking. Oriental dishes make use of daylily buds and the Romans used mallow, rose and violets. Italian and Hispanic cultures gave us stuffed squash blossoms and Asian Indians use rose petals in many recipes. Chartreuse, a classic green liqueur developed in France in the 17th century, boasts carnation petals as one of its secret ingredients.

Ongoing Research on edible flowers:

Jiayi Shi, Jinyan Gong, Ji'er Liu, Xiaqin Wu, Ying Zhang (2009) from China investigated on Prunus mume and showed that the chlorogenic acid isomers are the key phenolic compounds which are responsible for antioxidant activity of the ethanolic extract. Three chlorogenic acid isomers namely, 3-O-caffeoylquinic, 4-O-caffeoylquinic and 5-O-caffeoylquinic were isolated and purified. All the isolated chlorogenic acid isomers exhibited strong antioxidant activities. Prof. A. Sahoo & K. Sathish Kumar (2010) from India worked on Marigold and Rose and extracted essential oil by steam distillation method. Zhigang Tai, Le Cai, Lin Dai, Liuhong Dong, Mingfeng Wang, Yabin Yang, Qiue Cao, Zhongtao Ding (2011) from China

investigated on Sophora viciifolia and the study suggests that the flower S. viciifolia can provide valuable functional ingredients and can be used for the prevention of diseases related to various oxidant by-products of human metabolism. Monika Grzeszczuk, Aneta Wesolowska, Dorota Jadczak, Barbara Jakubowska (2011) from Szczecin made investigation in Allium Schoenoprasum and proved that the flowers contained much important fatty acids with palmitic acid (7.94-16.94%), linoleic acid (7.63-13.45%) and Vitamin E (0.16-0.49%). Otakar Rop, Jiri Mlcek, Tunde Jurikova, Jarmila Neugebauerova and Jindriska Vabkova (2012) from Czech Republic conducted experiments in different edible flowers such as Antirrhinum majus, Begonia boliviensis, Centaurea cyanus, Chrysanthemum frutescens, Chrysanthemum parthenium, Dianthus caryophyllus, Fuchsia x hybrid, Impatiens walleriana, Rosa odorata, Tagetes patula, Tropaeolum majus, Viola x wittrockiana and found that the highest levels of mineral elements were observed in the flowers of species Chrysanthemum, Dianthus or Viola. The most abundant element was potassium, the contents of which ranged from 1,842.61 to 3,964.84ma/kg of fresh mass. Sachidananda swamy H.C, Asha M.M, Chaithra M, Vivek M.N, Yashoda Kambar, Prashith Kekuda T.R. (2014) from India conducted antimicrobial activity of flower extracts of Caedalpinia pulcherrima, Delonix regia and Peltaphorum ferruginenum against urinary tract pathogens. Among the flower extracts higher inhibitory activity was shown by Caedalpinia pulcherrima followed by Peltaphorum ferruginenum and Delonix regia. Susceptibility to extract was recorded higher in case of gram positive bacteria when compared to gram negative bacteria. Among bacteria, S. aureus and K. Pneumoniae were inhibited to higher and least extent respectively.

Will they mingle with modernity:

Globalization has contributed not only to a better awareness of consumers but also to the comeback of earlier lifestyles, in which edible flowers played an important role. Moreover, new food-processing technologies as well as new logistic methods and quick distribution of cooled and well preserved foodstuffs have enabled us to return to earlier common and widespread food resources. This increasing demand has been and still is associated with efforts of producers and manufacturers of ready-to-cook food to extend and improve their offerings and to introduce new kinds of commodities. Nowadays, edible flowers are used as garnishes and mostly consumed fresh. Many fine restaurants around the UK and indeed the world are

Table: 1. list of some edible flowers

S.No	Common name	Scientific name	Flavor	Color	Comments
1	Anise hyssop	*Agastache foeniculum*	Anise	Lilac	Self-seeding perennial
2	Apple	*Malus* spp.	Floral	White to pink	*Eat in moderation since flowers contain cyanide precursors*
3	Arugula	*Eruca vesicaria sativa*	Spicy	White	Annual; once flowers form the leaves become bitter
4	Basil	*Ocimum basilicum*	Herbal	White, lavender	Annual
5	Bachelor's button	*Centaurea cyanus*	Vegetal	White, pink, blue	Annual; petals are edible; the calyx is bitter
6	Bee balm	*Monarda didyma*	Minty, sweet, hot	Wide range	Perennial
7	Borage	*Borago officinalis*	Herbal	Blue	Annual; use with nasturtium; *use sparingly -- diuretic effects*
8	Broccoli	*Brassica officinalis*	Spicy	Green	Annual
9	Calendula	*Calendula officinalis*	Slightly bitter	Yellow, orange	Annual; most often used for color rather than flavor
10	Chamomile	*Chamaemelum noblis*	Sweet apple	White	Perennial; *drink tea in moderation -- contains thuaone; ragweed sufferers may be allergic to chamomile*
11	Chervil	*Anthriscus cerefolium*	Herbal	White	Annual
12	Chicory	*Cichorium intybus*	Herbal	Blue	Perennial
13	Chives	*Allium schoeonoprasum*	Onion	Lavender-pink	Perennial; avoid eating whole flower; taste can be overwhelming
14	Chrysanthemum	*Chrysanthemum* spp.	Strong	Perennial	Use the florets; strong flavor
15	Dandelion	*Taraxacum*	Sweet,	Yellow	Perennial; use young flowers,

		officinale	honey-like		mature flowers become bitter; flowers close after picking
16	Daylily	*Hemerocallis* spp.	Vegetal, sweet	Wide range	Perennial; *may act as a diuretic or laxative; eat in moderation*
17	Dianthus	*Dianthus* spp.	Sweet clove flavor	Wide range	Perennial; remove the narrow base of the petals (bitter)
18	Dill	*Anethum graveolens*	Herbal	Yellowish-green	Annual
19	Elderberry	*Sambucus Canadensis*	Sweet	White	Perennial; do not wash flowers since it removes much of the flavor
20	English daisy	*Bellis perennis*	Mildly bitter	Pink	Perennial; ray flowers have a mildly bitter taste
21	Fennel	*Foeniculum vulgare*	Mildly anise	Yellow-green	Normally grown as an annual
22	Hibiscus	*Hibiscus rosa-sinensis*	Mildly citrus	Rose, red	Showy edible garnish
23	Hollyhock	*Althea rosea*	Vegetal	White, pink, red	Showy edible garnish
24	Honeysuckle	*Lonicera japonica*	Sweet	White to pale yellow	Perennial; *do not use other honeysuckle flowers*
25	Johnny-jump-up	*Viola tricolor*	Wintergreen	Purple and yellow	Annual; the petals have little flavor unless the green sepals are included; *contain saponins and may be toxic in large amounts*
26	Lavender	*Lavendula* spp.	Sweet, perfumed flavor	Lavender	Perennial; use sparingly due to intense flavor; *lavender oil may be poisonous*
27	Lilac	*Syringa vulgaris*	Varies	Lavender	Wide variation in flavor -- from no flavor to green and herbaceous to lilac
28	Linden	*Tilia* spp.	Honey-like	White	*Frequent consumption of linden flower tea can cause heart damage*
29	Lovage	*Levisticum officinale*	Celery	White	Perennial
30	Marigold	*Tagetes patula*	Bitter	Yellow, orange	Annual; Lemon Gem and Tangerine Gem have the best flavor
31	Marshmallow plant	*Althaea*	Vegetal	White, pink, red	
32	Mint	*Mentha* spp.	Minty	Purple	Perennial; each type of mint has its own unique flavor
33	Nasturtium	*Tropaeolum majus*	Spicy, peppery	Wide range	Annual
34	Okra	*Abelmoschus esculentus*	Vegetal	Yellow	Annual
35	Pansy	*Viola* x *wittrockiana*	Vegetal	Wide range	Annual; has a slightly sweet green or grassy flavor; petals have a mild flavor; whole flower has a wintergreen flavor
36	Passion flower	*Passiflora* spp.	Vegetal	Purple	Vine; showy flowers best used as a garnish
37	Pineapple sage	*Salvia elegans*	Sweet, fruity	Red	Perennial; flavor has a hint of mint and spice
38	Red clover	*Trifolium pretense*	Sweet	Red	Annual; raw clover flowers are not easily digestible
39	Rose	*Rosa* spp.	Perfumed	Wide range	Perennial: remove the white, bitter base of the petal
40	Rosemary	*Rosmarinus*	Herbal	Blue	Perennial

		officinalis			
41	Sage	*Salvia officinalis*	Herbal	Purple-blue	Perennial
42	Scarlet runner bean	*Phaseolus vulgaris*	Vegetal	Purple	Annual; flower only last one to two days
43	Scented geraniums	*Pelargonium* spp.	Varies	Wide range	Perennial; the flavor is usually similar to the scent of the leaves
44	Signet marigold	*Tagetes signata*	Spicy, herbal	Yellow	Annual; *may be harmful if eaten in large amounts;* other marigolds are edible but have a tangy to bitter flavor
45	Snapdragon	*Anthirrhinum majus*	Bitter	Wide range	Annual; use as a garnish
46	Squash	*Curcubita pepo*	Vegetal	Yellow	Annual
47	Sunflower	*Helianthus annuus*	Varies	Yellow	Annual; flower is best eaten in bud stage when it has an artichoke flavor; petals of open flowers have a bitter- sweet flavor; *pollen can cause a reaction for some people*
48	Sweet woodruff	*Galium odoratum*	Sweet, nutty, vanilla	White	*Can have a blood thinning effect if eaten in large amounts*
49	Thyme	*Thymus* spp.	Herbal	White	Perennial herb
50	Tulip	*Tulipa* spp.	Vegetal	Wide range	Bulb; good stuffed
51	Violet	*Viola odorata*	Sweet, perfumed	Purple, white	Perennial; use candied or fresh

Table: 2. Edible flowers and their benefits

Name of the Edible Flower	Benefits
Chives, Signet Marigold, Nasturtiums, Portulacas, Purslanes, Rose	Rich in Vitamin – C
Dandelions	Source of Vitamins A and C and the greens are high in calcium, iron and phosphorous.
Calendula and elderberry blooms	Aid digestion, reduce fevers and stimulate the immune system.
California poppies, Chamomile, and Lavender	Ease stress and work as gentle sleep aids.
Goldenrod	Relieve allergies and urinary tract infections, and aids in digestion.
Hibiscus	Contains antioxidants that help prevent cholesterol deposits and aids liver disorders.
Honeysuckle and Hyssop	Relieve respiratory problems and soothe the stomach and colon.
Mullein	Help respiratory ailments, pain and headaches and induce sleep, nasturtiums contain natural antibiotic properties.
Red clover	An excellent blood purifier and make a wonderful tasting tea.
Violas and Violets	Anti-inflammatory properties and are good for respiratory ailments, and yarrow helps relax blood vessels and reduce fevers and colds.

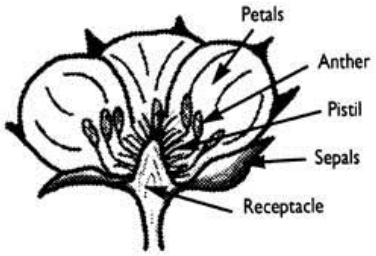
Table: 3. Ongoing Research on edible flowers:

S.NO	SCIENTISTS	PLACE	YEAR	FLOWERS WORKED	INFERENCES
1.	Jiayi Shi, Jinyan Gong, Ji'er Liu, Xiaqin Wu, Ying Zhang	China	2009	Prunus mume	The chlorogenic acid isomers are the key phenolic compounds which are responsible foe antioxidant activity of thr ethanolic extract. Three chlorogenic acid isomers namely, 3-O-caffeoylquinic, 4-O-caffeoylquinic and 5-O-caffeoylquinic were isolated and purified. All the isolated chlorogenic acid isomers exhibited strong antioxidant activities.
2.	Prof. A. Sahoo & K. Sathish Kumar	India	2010	1. Marigold 2. Rose	Extracted essential oil by steam distillation method.
3.	Zhigang Tai, Le Cai, Lin Dai, Liuhong Dong, Mingfeng Wang, Yabin Yang, Qiue Cao, Zhongtao Ding	China	2011	Sophora viciifolia	The study suggests that the flower S. viciifolia can provide valuable functional ingredients and can be used for the prevention of diseases related to various oxidant by-products of human metabolism.
4.	Monika Grzeszczuk, Aneta Wesolowska, Dorota Jadczak, Barbara Jakubowska	Szczecin	2011	1. Allium Schoenoprasum	The flowers contained much important fatty acids with palmitic acid (7.94-16.94%), linoleic acid (7.63-13.45%) and Vitamin E (0.16-0.49%)
5.	Otakar Rop, Jiri Mlcek, Tunde Jurikova, Jarmila Neugebauerova and Jindriska Vabkova	Czech Republic	2012	1. Antirrhinum majus 2. Begonia boliviensis 3. Centaurea cyanus 4. Chrysanthemum frutescens 5. Chrysanthemum parthenium 6. Dianthus caryophyllus 7. Fuchsia x hybrid 8. Impatiens walleriana 9. Rosa odorata 10. Tagetes patula 11. Tropaeolum majus 12. Viola x wittrockiana	The highest levels of mineral elements were observed in the flowers of species Chrysanthemum, Dianthus or Viola. The most abundant element was potassium, the contents of which ranged from 1,842.61 to 3,964.84ma/kg of fresh mass.

using more and more edible flowers to enhance salads with their colour, texture and intriguing flavours, as well as for decoration on appetizers, starters, cakes and many other dishes. Nevertheless, they can also be consumed dried, in cocktails (in ice cubes), canned in sugar, preserved in distillates, etc.

How to eat:

To avoid stomach upset or to determine if there is an allergic reaction, try a small quantity of the new flowers yourself. Edible petals or entire flowers can be eaten. However, remove stems, anthers and pistils because they may be bitter. Use flowers that are free of insects and diseases.



How to use:

It is always best to grow your own edible flowers, and then you can be sure that they are clean, fresh and free from pests and disease. The majority of edible flowers are always best picked fresh from the garden the day you want to use them. Growing your own also allows you to experiment and show off to dinner guests both what you have grown and what you've created with a colourful and tasty dish. As with any food and salad preparation always maintain good personal hygiene and practices. Even if you are not keen on experimenting with salads or sauces, edible flowers make excellent garnishes which, unlike some 'decorations' which appear in the guise of nouvelle cuisine, are actually nice to eat! Furthermore, as in Roman times, the flower garden becomes a treasure chest of delicately flavoured treats to scatter on your salads or to add a 'touch of class' to your culinary endeavors.

Flower fritters: The flowers of lilac, elder, marrows and squashes, and fruit blossoms can all be dipped in batter and deep fried. The marrow flowers can also be stuffed with fried onion, breadcrumbs and parsley, before deep-frying in batter.

Flower Vinegar: White wine or cider vinegar can be flavoured with flowers. Primrose, rose, violet, elderflower, nasturtium, lavender, rosemary and thyme can be used. Fill a jar to two-thirds full with the flowers and top it off with vinegar. Leave on a sunny windowsill for 2 weeks.

Other Possibilities: Preserves. Syrups. Crystallised blooms. Water Ices. Sweet sauces and desserts. Sandwiches and flans. Tisanes (teas).

How to preserve:

Fresh flowers also can be preserved for later use. Choose flowers with larger petals, such as pansies, and paint the petals with an egg-white wash. Use a soft brush and dehydrated egg whites to avoid food borne illness. These flowers are edible if the dehydrated egg powder has been pasteurized. After painting, dust the petal with super-fine granulated sugar and dry it. Store preserved flowers in an airtight container in a cool, dark place. Avoid dark-colored petals; they turn even darker with this treatment

Some flowers dry well, while others lose their flavour. Check by drying a small sample before drying an entire crop. Gather flowers in early morning before the sun shines on them. Hang upside down by the stems in a dark, well-ventilated area. (Flowers without stems can be dried on a fine screen.) Once dry, label and store in an air-tight container in a cool, dark place.

Risks:

Some flowers are safe to eat only in small amounts. Flowers commonly carry traces of pesticides and harbor organisms such as insects. Flowers cultivated as ornamental plants for garden use are not intended for use as food. Common garden flowers which are ALL POISONOUS to a greater or lesser degree should be especially avoided.

- Apple flowers (*Malus* spp.) contain cyanide precursors.
- Johnny jump-ups (*Viola tricolor*) contain saponins.
- Borage (*Borago officinalis*) and daylily (*Hemerocallis* spp.) flowers are diuretics.
- Sweet woodruff (*Galium odoratum*) can have blood-thinning effects.
- The flowers of linden trees (*Tilia* spp.) are reportedly safe in small amounts but heavy consumption can cause heart damage.
- Marigolds (*Tagetes* spp.) can be harmful in large amounts, and only certain species have an appealing flavor.
- If you are pregnant, be sure to research possible contraindications to Agastache (*Agastache anisata, Agastache foeniculum*).
- Only tuberous Begonia (*Begonia tuberhybrida*) petals are edible. The petals contain oxalic acid and therefore should only be eaten in moderation and should not be consumed by individuals suffering from gout, kidney stones or rheumatism.
- Pregnant and lactating women should avoid Borage (*Borago officinalis*) flowers, as more than eight to ten flowers can cause milk to flow. They can also have a diuretic effect, so should not be eaten in great quantity.

- If you have hay fever, asthma or severe allergies, you should avoid eating flowers of the Daisy (*Bellis perennis*) family because they could trigger an allergic reaction.
- Only *chrysanthemum coronarium* should be eaten; it is not advisable to eat other types of chrysanthemum.
- Only *Jasmine officinale* is edible. The false Jasmine (*Gelsemium sempervirens*) is a completely different genus and is considered too poisonous for human consumption.
- Marigolds (*Tagetes patula, Tagetes tenuifolia, Tagetes patula x erecta)* may be harmful in large amounts. They should only be eaten occasionally and in moderation.
- Vegetable pea (*Pisum sativum*) flowers can be eaten, not sweet pea flowers which are toxic.
- Perennial phlox (*Phlox paniculata*), not the annual, or the low-growing (creeping) phlox that is edible.
- Scarlet-flowered Runner beans (*Phaseolus coccineus)* are recommended for eating.

R**eminders:**

- ❖ Do not use flowers exposed to pesticides or those growing by the roadside. Also, be cautious if you have hay fever, asthma, or allergies.
- ❖ Harvest flowers in the morning after the dew have evaporated. Choose flowers at their peak for best flavour. Put long-stemmed flowers in water and keep in a cool place. Use short-stemmed blossoms within a few hours of harvest or store between layers of damp paper towelling or in a plastic bag in the refrigerator. Just before using, gently wash flowers, checking thoroughly for insects and soil.
- ❖ Remove the stamens and pistils from the flowers. Also remove the green, leaf-like sepals at the base of the flowers.

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