Flowers for edible gardens: combinations of species and colours for northwestern Italy

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Abstract

Flowers have been used for centuries to flavour and garnish food in several ancient cultures, both in Europe (Romans and Greeks) and Asia (Chinese and Indians). After a period of abandon, the recent growing interest towards nutraceutical and functional food revives the consumption of edible flowers. Edible flowers represent an important source of biologically active compounds with positive effects on consumer health. Flowers are in fact a source of mineral elements and phytochemicals with remarkable antioxidant activity. The Alcotra Fr-It 2014-2020 ANTEA project aims at developing a transboundary supply chain (France-Italy) of edible flowers. The activities involve also the design and planning of new *edible landscapes*, i.e. multi-functional spaces with aesthetic value aimed to the production of edible flowers. In this report, we analysed and selected ornamental species with edible flowers suitable for garden design in northwestern Italy.

Keywords: nutraceutical, ornamentals, urban landscape, urban horticulture

INTRODUCTION

Flowers have been used in traditional cooking as decoration, relishes and flavour enhancers by several cultures and for several thousand years, from Asia to ancient Greece and Rome, from medieval France to Victorian England (Mlcek and Rop, 2011; Lu et al., 2016). In recent years, edible flowers are increasingly demanded worldwide due to their health benefits (Lu et al., 2016). Flowers have indeed nutritional compounds such as proteins, amino acids and carbohydrates, but above all phytochemicals, i.e. bioactive non-nutrient compounds mainly represented by carotenoids and phenolics, which strongly reduce the risk of major chronic diseases (Sandhya et al., 2014; Liu, 2003).

The ecological importance of urban landscapes can be deeply enhanced through the planning of gardens composed by edible flowers, in which the aesthetic value of ornamental plants is combined with the nutraceutical properties of their flowers. This approach of *edible landscape* was recently adopted to design a public garden situated in Cherasco (CN, Italy, 44°39'14.0"N 7°51'25.9"E), in the framework of the Alcotra Fr-It 2014-2020 ANTEA project.

In this paper, we report the criteria and the characteristics of the species selected accordingly, which can be adopted in other sites with similar environmental conditions.

MATERIALS AND METHODS

Ornamental species were selected according to five main criteria: (I) the flower edibility, which was carefully verified by examining the scientific literature; (II) the adaptability to the site's environmental conditions (44°39'14.0"N 7°51'25.9"E); (III) the low maintenance requirements, which have led to prefer perennial plants; (IV) flower colour assortment and (V) bloom at different times of the year. For each species selected, the uses as food and the properties were then documented.

RESULTS AND DISCUSSION

The species selected to design and plan the public garden of Cherasco and their characteristics are reported and described in Table 1, grouped by flower colour. These species

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could be effectively combined to design a urban garden, fulfilling the growing interest of merging ornamental and edible plant in the same place.

Table 1. List of the species selected in the project, grouped by flower colour, with related flowering time, beneficial properties and food use.

Flower colour	Species	Flowering time	Flower properties	Eaten in/as
Rose	*Allium schoenoprasum* L.	June-August	Antioxidant, antibacterial, anticancer [1,2]	Flavouring of butter, oil, cooked vegetables, salads, cheeses, pasta and rice. Mild onion flavour and taste
	Antirrhinum majus L.	May-September	Antioxidant, antimicrobial [3,4]	Salads
	Dianthus caryophyllus L.	May-August	Antioxidants, antibacterial [3,5]	Flavouring of oil, vinegar, vegetable and fruit salads. Decoration of cakes and bakery products. Clove flavour
	Hibiscus syriacus L.	June-September	Antioxidant [6]	Salads, soups and herb teas. Food colouring
	Trifolium pratense L.	January-December	Expectorant, antispasmodic [7]	Salads and herb teas
Blue-Violet	*Borago officinalis* L.	April-August	Purifying, emollient, antitussive, diuretic, sudorific, anti-inflammatory [1,8,9,10]	Salads, soups, desserts, syrups and drinks. Cucumber taste
	Crocus sativus L.	September-November	Antioxidant, antidepressant, anti-inflammatory, sedative, carminative, eupeptic [1,8,9,10]	Salads. Stigmas are known as saffron
	Cynara cardunculus L.	June-August	Anticancer, antioxidant, antimicrobial, anti-inflammatory, eupeptic, diuretic, hepatoprotective [1,8,9,11,12]	Vegetable rennet is produced from dried flowers
	Lamium purpureum L.	March-October	Antioxidant [1,13]	Snacks or decoctions
	Lavandula angustifolia Mill.	June-September	Antispasmodic, antiseptic, sedative, carminative, cicatrizing [1,8,9]	Flavouring and decoration of cakes and bakery products. Essential oil to flavour food
	Passiflora incarnata L.	June-July	Antispasmodic, sedative, soothing, anxiolytic [1,8,9,14,15]	Herb teas and syrups
	Rosmarinus officinalis L.	April-August	Antibacterial, antispasmodic, antioxidant, anti-inflammatory, antiseptic, eupeptic [1,8,9,16]	Flavouring of butter, oil, salads, soups, broths, roasts. Essential oil to flavour food
	Viola odorata L.	February-April	Antitussive, diuretic, emollient, expectorant [8,9,17]	Salads, creams. Flavouring and decoration of herb teas, cakes and bakery products
White	*Allium ursinum* L.	May-June	Antioxidant, anti-inflammatory, antimycotic, cardio protective [1,18,19]	Garlic substitute
	Bellis perennis L.	January-December	Antispasmodic, anti-inflammatory, antidepressant, diuretic, expectorant [8,10]	Salads and soups

Flower colour	Species	Flowering time	Flower properties	Eaten in/as
(continued)	*Crataegus monogyna* Jacq.	April-May	Antioxidant, antispasmodic, sedative, hypotensive [1,8,9,20]	Syrups, puddings and herb teas. Flower buds are eaten in salads
	Magnolia denudata Desr.	March-April	Antioxidant[15]	Salads. Fried in batter. Pickled, to flavour rice
	Osmanthus fragrans Lour.	Spring and autumn	Antioxidant, anti-inflammatory, antitussive [21]	Herb teas, decoctions and sweets. Apricot flavour
	Sambucus nigra L.	April-June	Antioxidant, anti-inflammatory, antibacterial, diuretic, emollient, sudorific, laxative [1,8,9]	Herb teas and drinks. Flavouring honey, jellies and jams
Yellow-Orange	*Calendula officinalis* L.	June-December	Anti-inflammatory, antispasmodic, antiseptic, hepatoprotective, emollient, refreshing, cicatrizing [1,8,9,22]	Flavouring and decoration of salted dishes, bakery products and herb teas. Food colouring
	Helianthus tuberosus L.	August-October	Antibacterial, antimycotic [23]	Decoration of soups and rice
	Helichrysum italicum G.Don	May-September	Anti-inflammatory, antibacterial, emollient, antitussive, expectorant [1,9,24]	Herb teas and drinks. Essential oil to flavour food
	Hemerocallis fulva L.	May-June	Antioxidant, anticancer [25]	After drying, flavouring of salted and sweet dishes. Flower buds have peas flavour
	Mahonia aquifolium Nutt.	April-May	Antioxidant [26]	Herb teas and drinks
	Primula vulgaris Hudson	February-May	Antioxidant [27]	Flavouring and decoration of cakes, bakery products and salads. Frozen, to flavour drinks and sorbets
	Taraxacum officinale Weber	February-May	Antioxidant, anti-inflammatory, hepatoprotective, diuretic, laxative, depurative, analgesic [1,8,9,28]	Salads and soups
	Tilia cordata Mill.	May-June	Antispasmodic, antitussive, diuretic, emollient, refreshing, sedative, anxiolytic [1,8,9,29]	Herb teas and decoctions
Various	*Mentha* spp.	April-October	Antioxidant, antimicrobial, antispasmodic, antitussive, anaesthetic, tonic, carminative [1,8,9]	Decoration. Essential oil to flavour food
	Prunus spp.	March-April	Antioxidant, anticancer [30,31]	Flavouring and decoration of soups, salads and sweets. Pickled
	Rosa spp.	May-July	Antioxidant, inflammatory, antibacterial, neurotonic [1,8,9,32]	Salads. Dried, flavouring and decoration of herb teas, drinks and sweets
	Salvia spp.	March-August	Inflammatory, antibacterial, antiseptic, eupeptic [1,8,9]	Flavouring of butter, vinegar, oil, salads and creams. Essential oil to flavour food

Flower colour	Species	Flowering time	Flower properties	Eaten in/as
(continued)	*Thymus* spp.	April-August	Antioxidant, antiseptic, antimicrobial, antispasmodic, eupeptic, diuretic, sedative, anti-rheumatic [1,8,9,33]	Flavouring of butter, oil, cooked vegetables, salads, soups, pasta and drinks. Essential oil to flavour food

[1]Marzi and De Mastro, 2008
[2]Kucekova et al., 2011
[3]Rop et al., 2012
[4]Riaz et al., 2013
[5]Mohammed and Al-Bayati, 2009
[6]Geng et al., 2012
[7]Lin et al., 2000
[8]Maugini et al., 2006
[9]Corbetta et al., 2001
[10]Grzeszczuk et al., 2016
[11]Velez et al., 2016
[12]Christaki et al., 2012
[13]Budzianowski and Budzianowska, 2006
[14]Dhawan et al., 2001
[15]Lu et al., 2016
[16]Kontogianni et al., 2013
[17]Vishal et al., 2009
[18]Sobolewska et al., 2015
[19]Sendl, 1995
[20]Barros et al., 2011
[21]Wu et al., 2009
[22]Muley et al., 2009
[23]Denoroy, 1996
[24]Sala et al., 2002
[25]Fu et al., 2009
[26]Gunduz, 2013
[27]Demir et al., 2014
[28]Schütz et al., 2006
[29]Anesini et al., 1999
[30]Shi et al., 2009
[31]Lee et al., 2007
[32]Ochir et al., 2013
[33]Nikolić et al., 2014

Acknowledgments

This study was financially supported by the Interreg-Alcotra Fr-It 2014-2020 ANTEA project n.1139, Comune di Cherasco, Compagnia di San Paolo, Fondazione CRC, and Fondazione CRT. The authors wish to thank Don Angelo Conterno for promoting the garden's initiative, and the landscape designer Marialuce Reyneri di Lagnasco for the collaboration.

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