

# EVALUATION OF THE POSSIBILITIES OF USING RUNNER BEAN (*PHASEOLUS COCCINEUS* L.) IN LANDSCAPING DESIGN

## EVALUAREA POSIBILITĂȚILOR DE FOLOSIRE A FASOLEI MARI (*PHASEOLUS COCCINEUS* L.) ÎN DESIGN-UL PEISAGER

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**Abstract.** *The paper presents an overview of the specialized literature on runner bean decorative valences, determined by the main morphological, physiological and technological characteristics of this species. The paper aims is to promote the species as an ornamental plant in the specific conditions of our Romania. The main morphological characteristics refer to growth mode, habitus and plant strenght, foliage color, flower color, inflorescence number and its dynamics, shape, size and color of pods, number of pods per plant, shape, size and color of seeds. Physiological particularities refer to the main culture phenophases, their duration, the duration of the ornamental and vegetation period. Technological particularities relate to the time and manner of establishing a culture, different plant layout devices, using the support system and some specific care works.*

**Key words:** *mixed gardens, decorative valences, support system*

**Rezumat.** *Lucrarea prezintă o sinteză a literaturii de specialitate referitoare la valențele decorative ale fasolei mari, determinate de principalele caracteristici morfologice, fiziologice și tehnologice ale acestei specii. Lucrarea are ca scop promovarea acestei specii ca plantă ornamentală în condițiile din România. Principalele caracteristici morfologice fac referire la modul de creștere, habitusul și vigoarea plantei, culoarea foliajului, culoarea florilor, numărul de inflorescențe și dinamica acestuia, forma, mărimea și culoarea păstăilor, numărul de păstăi pe plantă, forma, mărimea și culoarea semințelor. Particularitățile fiziologice fac referire la principalele fenofaze în cultură, durata acestora, durata perioadei ornamentale și durata perioadei de vegetație. Particularitățile tehnologice se referă la epoca și modul de înființare a culturii, diferite dispozitive de aranjare a plantelor, folosirea sistemului de susținere și unele lucrări de îngrijire specifice.*

**Cuvinte cheie:** *grădini mixte, valențe decorative, suport de susținere*

### INTRODUCTION

The cultivation of vegetables with ornamental value has a long tradition since ancient times, the vegetable crop marked by a great diversity of taxons (species, subspecies, varieties and forms), cultural practices and traditions of use. The huge biodiversity of vegetable species and their great movement across the globe have allowed the evidence of many uses, besides the nutritive value, such as

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in landscaping, phytotherapy, cosmetics etc. Are known many taxons of vegetable plants what can successfully replace a series of ornamental plants within a landscaping, because of their decorative appearance. Vegetables can be placed alongside other vocation ornamental plants (flower and deontological), arranged in clusters and distributed according to size or habitus. Also, there might be places in the landscape to be used only for this type of vegetable plant with ornamental features. Decorative vegetables have a dual role, that of decorating a space in the garden or on the terrace of the house, but also to ensure vegetable products, food value recognized, combining harmoniously with pleasure (<http://www.floricultura.ro/includerea-plantelor-leguminoase-in-amenajarile-peisagere/>).

The ornamental value of vegetable plants results from their own morphological characteristics: size and general habitus of plants, shape, appearance, size and color of the leaves, flowers and fruits (Muntean *et al.*, 2011). The ornamental value also results from some phenological features (vegetation period, ornamental period, the foliage, flowers, fruit etc.). Of great interest and importance is the arrangement, the alignment of these vegetable plants, ornamental features even lower, such as running groups and even some artistics, in field, garden spaces, terraces, balconies, pergolas, large or small pots, jardiniere etc. The importance of growing vegetables with ornamental value arising from permanent human need for more opportunities to create beauty. Has ever since been, man has been attracted to nature. Vegetable plants with ornamental value can be considered today as an opportunity to increase the diversity of landscape (Iliescu, 2008). Garden art provides a shining example of the use of vegetable plants in decorative arrangement – the park from Villandry castle, in France, in the Renaissance manner (Iliescu, 2008). The vegetables with ornamental value along with other ornamental plants contribute to combate air pollution and to establish an equilibrium in environment. Lately there is a particular focus on achieving a healthy gardens and decorative at the same time. Also are trying to achieve mixed gardens where vegetables and flowers are harmoniously associated, taking into account the allelopathic relations (<http://www.gradinavesela.ro/2014/02/gradini-de-legume-decorative/>).

Cultivated in the green spaces they extend their utility through social utility character that it acquires. The vegetation in parks, gardens, squares and roads besides visible influence the microclimate of population centers. It helps purify the air and is an absolute necessity of modern life, springing from the unprecedented development of the industry through residues resulting from processes, vitiating the environment. The use and knowing of differential habitus, forms and colors, flowers, leaves and fruits, while that can easily adapt to specific environmental conditions of a site, constitutes the starting point in approaching the creation of landscape architecture (Mărgărit *et al.*, 2004).

In this paper we propose an overview of runner bean (*Phaseolus coccineus* L.), with emphasis on ornamental value. Ornamental value analysis is made with special reference to biological characteristics, ecophysiological and ornamental, as well as how to use in landscaping.

## MATERIAL AND METHOD

Biological material to which evaluations are made on the vocation ornamental is runner bean species (*Phaseolus coccineus* L.) and some of its subspecies and varieties. Runner bean is a herbaceous annual species which normally is multiplied by seed, but in some cases vegetative with tuberous roots (Munteanu, 1985). In this study we propose to consider as many subspecies of *P. coccineus* species such as *P.c. ssp. formosus* (Kunth) Mare, Masch. & Stain, *P. c. ssp. glabellus* (Piper) A. Delgado, *P. c. ssp. griseus* (Piper) A. Delgado, *P. c. ssp. coccineus* L. and *P. c. ssp. darwinianus* Hdez. X. & Miranda C.

Achievement of the aim and targets is made on the basis of a literature review, systematized on groups of botanical, physiological and technological features which confers ornamental and / or landscape value. As a basic research methods have been used observation, case study and statistics grouping.

## RESULTS AND DISCUSSIONS

The runner bean is a vegetable species with a broad interest to growers, both in terms of food and ornamental. In terms of food, runner bean is grown for **green pods, immature seeds and dry seeds** (Munteanu, 2005). In Central America are use in food also **the tuberous roots** (from ssp. *darwinianus*), rich in starch, after being cooked, and the boiling liquid has been removed (Kay, 1979). In Mexico, **the leaves and young shoots**, as well **the flowers**, are boiled and then fried, consumed as they are, after seasoning with garlic and onions in the form of various meat trimmings (Popa, 2010). The flowers can be used for flowers or fried pancake (<http://www.petitchef.ro/retete/clatite-cu-flori-de-salcam-fid-859027>).

Native of Mexico and Central America, the species prefers a cool and moist climate, unlike the common bean (*P. vulgaris* L.) showing a high degree of rusticity and ecological plasticity, being resistant or tolerant to pathogens. Of great importance is that this rusticity assures high suitability of sustainable agriculture systems, including biological / organic / ecological. The runner bean's ornamental value is conferred by the appearance of the entire plant, from seed germination mode, hypogeal, and continuing with every stage of plant growth and development, ending with the end of the vegetation period (Munteanu, 1985a).

**The harmony of colours** in landscape composition is determined by the combination of several colors, being found that one color stands out in opposition to another, so that instead of exclusion, they place more value (Şelaru, 2004). Runner bean attract more eyes in the landscape and it imposes especially during flowering. Through this work, the landscape composition is based on the dominant runner bean effects, achieving a harmonious landscape, renneted and aesthetically. For a good and quality landscaping, it is necessary to know the landscape qualities of plants and also their biological characters and their ecological requirements.

**The stem** is herbaceous, slightly twisted, fine-edged, more vigorous compared to that of the common bean. Voluble stem forms are known as well as on common bean, with few branches or dwarf stem (bush or determined) (Kay, 1979).

**At the bush bean**, the main stem along with branches of higher order is right and at the climbing bean is straight in the young stage until it reaches a

height of 15-20 cm, after which it becomes voluble. The strain, at bush bean, has a height of 30-40 cm and has many branches, giving the plant a bushy shape. Typically, the bean has a relatively thick stem on the base without being rigid. It has a cylindrical shape, edged or slightly flattened at the top and on its surface are numerous bristles.

**At the runner bean**, the stem has very less branches (the lower half), with 3-5 branches on average, but indeterminate length is increased, peaking at 3-4 m volubility is achieved by twisting the stem and the branches thereof the support, counterclockwise. Near the stem appear the flowers, and the other are successively formed as soon as they form new nodes. The number of branches, length and diameter of the stem are in a continuously growing from emergence until to the pods formation.

Usually, the stem color is green during the vegetation period and yellow-brown at maturity. The leaves are trifoliate, with ovate or broadly-ovate leaflets, acuminate to long-acuminate at apex and rounded to truncated at the base (Salinas, 1988); the first two true leaves are simple and opposite. The buds are formed in the armpit leaves, ones at the base evolve in the ramifications of the stem and ones from the top becoming the inflorescences.

**The flower** is typical of *Phaseolus* genus, zygomorphic and hermaphrodite. The flowers are grouped in multiflorous bundles located on pseudoracemes (60 cm long). The inflorescence is terminal at dwarf forms (which makes the stem and its ramifications have a determinate growth habit) and axillary at vining forms (which ensures an indeterminate growth of the main stem and all branches). The corolla color can be white, gray and white to yellow, red, red with white wings, purple or lilac. In Romania, the runner bean due to their abundance of flowers and coloring, is known as "the bean of flower" (Munteanu, 1985a).

**The fruits** are pods typical of the *Papilionaceae* family. They are, in fact, the modified carpels which are closed more seeds, disposed on the dorsal welding line. These are large, with length between 10 - 26 cm, width 1.5-2.5 cm and thickness from 1.3 to 1.9 cm, linear-oblong in shape, slightly curved, ending with a distinct rostrum and are coarse to the touch (Olaru, 1982; Munteanu, 1985b).

**The pods** contains 4-6 seed. Usually, they are dehiscent, but many of the cultivated forms for green pods are indehiscent (Kaloo, 1995). Initially, all the pods are green, and as they approach the edible maturity becomes pale green, yellow or dark green, and finally, beige or brown-gray, typical of the variety (Olaru, 1982; Munteanu, 1985b).

**The seeds** are round, almost spherical, oblong or slightly kidney-shaped (Munteanu, 2005), big or very big, 15-22 mm long, 10-15 mm wide, 7-10 mm thick (Munteanu, 2005; Popa, 2010) and a mass of 1000 seeds of 950-1250 g (Munteanu, 2005), white colour, black, light brown or purple or beige or purple with a punctiform drawing or as an darker arabesque. Just like flowers, the seeds of runner bean have their decorative valences which are highlighted in different ways.

**The phenology** of the plant in culture, in conditions of our country, varies depending on the variety (cultivar) and climatic conditions of the area. The period from sowing to the springing of the runner bean is between seven and 10 days, the

period from the springing to the first flowers appearance range from 30-36 days, the period from the springing to the first pods appearance have values between 60 and 70 days and the period from springing to the seed maturation is between 107 and 122 days (Hamburdă *et al.*, 2014; Munteanu *et al.*, 2013; Popa, 2010). The flowering lasts about 20-25 days at the dwarf varieties and is taking place in July-September and more than 60 days at the climbing varieties. The flowers in a raceme lasts 10-15 days and begin to open itself from the base to the top (Olaru, 1982).

As a **specific care works** are watering, the construction of a support system and the pinching. How to use the runner bean crop is the fact that it, through habitus, leaves, flowers and fruits, forms a temporary setting. Considering the climbing part of the species, this can be used as a hedge that can mask unsightly various areas of the gardens. Also, the base unit of the plant is extremely diverse and inventive. The support can be made of wood, sugar cane, plastic products, metal, sizes and different types, but it is considered that they are not exaggerated or unaesthetic. The plants can be supported through the wire mesh (nylon and string). As a support can also be used the stems of the associated plants, for example, those of sunflower, maize, Jerusalem artichoke etc. (Hamburdă *et al.*, 2013).

In the landscape of a garden, runner bean can be used both in simple compositions and in the mixed compositions, in splashes of color, and because it can be used as a climbing plant, it can grow easily on pergolas, trellis, columns and archways. The runner bean is grown in pots, possibly in decorative vases, embellish the spaces where are located. The crop can be achieved, with good success, also in greenhouses or in polytunnels, but usually, to obtain green pods is mandatory the presence of pollinators.

## CONCLUSIONS

1. The runner bean is a vegetable species that deserves more attention, given the importance of food, and the importance of decorative value. The botanical and ecological peculiarities show that the runner bean is a species with hypogeic germination, is preferring a cool and moist climate, with a high degree of rusticity and ecological plasticity, being resistant or tolerant to pathogens.

2. The remarkable decorative value is conferred by the size and general habitus of the plant, shape, appearance, size and color of the leaves, flowers, fruits and seeds.

3. The runner bean beautify by flowers, a period of about 60 days, from July to September; the period from springing to the appearance of the first flower is 30-36 days and the flowers in a raceme lasts 10-15 days and begin to open itself from the base to the top; the colour of the corolla can be white, gray and white to yellow, red, red with white wings, purple or lilac.

4. The ornamental value is also conferred by the shape, size and color of the seeds, with the mass of 1000 seeds of 950-1250 grams, white colour, black, light brown or purple or beige or purple with a punctiform drawing or as an darker arabesque.

5. This species is mostly used in mixed gardens, aiming at obtaining a healthy and decorative garden at the same time.

6. The runner bean are among the species chosen by those who grow vegetables as an extra-activity (hobby); in this case, the support system of the plant is extremely varied and inventive by placing it at the expense of achieving beauty combined with the creation of favorable conditions for the growth and the development of the plant.

*Acknowledgments:* This paper was published under the frame of European Social Fund, Human Resources Development Operational Programme 2007-2013, project no. POSDRU/159/1.5/S/132765.

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