

## PRELIMINARY STUDIES REGARDING THE ESTABLISHMENT OF AN ORNAMENTAL GARDEN IN A GEOMETRICAL STYLE USING VEGETABLE PLANTS IN INTERCROPPING SYSTEM

### STUDII PRIVIND REALIZAREA UNEI GRĂDINI ORNAMENTALE ÎN STIL GEOMETRIC UTILIZÂND PLANTE LEGUMICOLE ÎN SISTEM DE INTERCROPPING

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**Abstract** This paper presents a literature review of the species *Lactuca sativa* L. regarding its decorative characters and productive potential, in association with other vegetables, based on morphological, physiological and technological characteristics. Based on these characteristics, the geometric display of the species and the possibility of growing them in intercropping system was elaborated. The studied species are two tips of lettuce, Lollo Rossa and May King, in intercropping systems with spinach, red orache, onions and lavender. The obtained results were congruent with the ones that specialized literature offered, the needed ornamental valences of an aesthetic family vegetable garden are offered by the decorative characters of the chosen species.

**Key words:** Classic garden style, Vegetables, Production.

**Rezumat.** Lucrarea prezintă o sinteză a literaturii de specialitate referitoare la caracterele decorative și cele ale potențialului productiv ale speciei *Lactuca sativa* L. în asocieri cu alte plante legumicole, pe baza principalelor caracteristici morfologice, fiziologice și tehnologice ale acestei specii. Pe baza acestora a fost elaborată dispunerea în stil geometric a speciilor alese și posibilitatea cultivării lor în sistem de intercropping. Au fost luate în studiu două soiuri de salată, Lollo Rossa și May King, asociate cu spanac, lobodă roșie, ceapă și levănțică. Rezultatele obținute au fost în concordanță cu cele întâlnite în literatura de specialitate, caracterele decoartive ale speciilor alese oferind valențele ornamentale necesare unei grădini legumicole estetice în cadrul familial.

**Cuvinte cheie:** asociere, grădină decorativă, producție.

## INTRODUCTION

Humans began practicing agriculture 15-20.000 years ago, close to the end of the Neolithic period, until then they were hunters and gatherers. The first step in becoming a farmer was to tame and grow plants; historically speaking this

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represents the start of the first agrarian revolution. Through out time, as agriculture evolved, man has continued to enhance, and to perfect, the way that plants are cultivated, so that in our days the evolution of scientific and technical knowledge allows us to see the prominence in the agricultural systems.

According to their degree of development, we can observe systems that range from simple to complex and modern, with a great degree of intensification and usage of resources, such as precise agriculture and smart agriculture.

In the practice of vegetable growing, in these circumstances, from the beginning of time, plants were grown blended, associated or in intercropping system. A modern intercropping system, much used in our days, must be defined from a biological and ecological point of view, in the same time we must enhance as many crop valances as we can, including ornamental ones. Thus we reached the practice and concept of vegetable gardens.

The ornamental character of vegetable gardens aroused at first in the court of noble palaces and monasteries. Among the most noted and beautiful vegetable gardens, that passed the test of time, can be found in France. The court of Villandry Castle is renowned for its aesthetic and playful design, in which vegetables are presented in different stages of their development (Kluckert, 2007).

The ornamental vegetable garden can be found within the family yard, and it must carry out many conditions, from the financial one, to the nutritive and aesthetic ones. Vegetable gardens were a part of individual yards from ancient time. The decorative character of this landscape projects emerged through time, with different titles. The concept of edible landscaping belongs to Robert Kourik, known ecologist and american writer, this concept was then adopted by the renowned architect Rosalind Creasy. Nowadays the concept has suffered a widening of its significance, and it is used both in family gardens and in public establishments. The widening of the concept has permitted its ramification, from growing ornamental species with some vegetables, to ornamental designs only with vegetables (Sima, 2009).

Regarding the possibility of exploitation of the accumulated knowledge of an ornamental vegetable garden in a family setting, we consider of interest to synthesize this knowledge and to create an ecological and biological database which will allow to create this type of gardens in a scientific manner. In our research we also have in sight their alimentary and therapeutic importance of the chosen species.

Due to its alimentary importance and its therapeutic effects *Lactuca sativa* L. is a necessary species that can't be absent from human alimentation. Lettuce is a rich species in vitamins (vit. A, vit. C, vit. PP), mineral salts (Ca, Fe, P, K) and nutritious substances (Stan *et al.*, 2003). From the traditional point of view, lettuce is known for its therapeutic goods, regarding ache treatments, digestive and inflammatory problems of the stomach, and in the same time for its antidepressant and antioxidant properties (Hammad and Bushra, 2015).

In this study we want to do a display of the steps that must be followed in order to realize an ornamental vegetable garden in a classic style, in an ecological system, by applying intercropping technology. The main objects of this study are to identify how to associate lettuce with other species, based on its biological and ecological requirements, and to increase its ornamental impact.

## MATERIAL AND METHOD

For the fulfillment of the established purpose and objectives, an experience was organized in the experimental field of the Vegetable growing department, at the USAMV farm V. Adamachi, in the year 2015.

The biological material used in the experience was: two varieties of lettuce (*Lactuca sativa* L.), May King and Lollo Rossa, two varieties of spinach (*Spinacea oleracea* L.), Matador and Modi F1 hybrid, a local population of red orache (*Atriplex hortense* L.), white communal onion (*Allium cepa* L.) and Common English lavender (*Lavandula angustifolia* Mill.).

The experience was realized on a 20 m<sup>2</sup> area, in a geometric style based on symmetry, balance and rhythm. The ornamental vegetable garden includes two rectangles in a mirror design. The rhythm of the establishment is given by the flowers made from lettuce, in a total of six, based on a game of chromatics and shape, with a total of 204 seedlings, from which 112 were May King variety and 92 Lollo Rossa. The distance between the rows of lettuce was of 20 cm and between plants 30 cm. The spinach was sown at the distance of 20 cm between rows, which were in number of three, between the flowers made of lettuce, with a total of twelve rows. In the outer corners of the garden design red orache seedlings were planted, while in the inner corners lavender was planted. The landscape design was outlined by an onion headboard, from white chive. The garden was established between 28.04-01.05

The experience was conducted according to crop technology found in literature review (Stan *et al.*, 2003; Sima, 2009; Ciofu *et al.*, 2003). The crop was established on leveled ground, well stocked with nutrients and organic matter, in an ecological system.

The applied research methods are bibliographic study, observation and experiment, based on which the performances of *Lactuca sativa* L., regarding ornamental and agricultural productivity characters, were evaluated.

## RESULTS AND DISCUSSIONS

Lettuce is grouped in three varieties, head lettuce, marula and leaf lettuce. *Lactuca sativa* L. is an annual plant, with a short vegetation period. It has a taproot system, with numerous side ramifications, but with a superficial developing in seedling. Due to the different characters that the varieties of lettuce present, size, form and color of leafs, vary from one kind of lettuce to another. The short period of vegetation gives us the freedom to establish this crop by using seedlings or seeds, thus lettuce is suitable in successive crops or intercropping system (Ciofu *et al.*, 2003).

May King lettuce is a part of the head lettuce variety, suitable for an open ground crop. This variety of lettuce formed medium sized head, which can be observed in Fig. 1.

Compared to May King lettuce, Lollo Rosso is a variety of leaf lettuce, with italian origin, that has a rich, well developed and compact rosette, with numerous ornamental characters. Leaves are green at the base and burgundy at the top, with an undulated lamina, that can be seen in Fig. 2.



**Fig. 1** - Lollo Rosso lettuce



**Fig. 2** - May King lettuce

Based on the ornamental characters of the two chosen varieties of lettuce and due to the positive effects that this species has on the human body, it represents an essential element in a vegetable garden at the beginning of the year.

Being a part of the vegetable greens group, lettuce was suitable in a successive and associated crop. The intercropping system presented numerous advantages, among them were, the increase of agro ecosystem diversity, reduced soil erosion and reduced degree of weeds. Beside this advantages, in the vegetable garden, there were also less pests or disease attacks and reduced quantity of water used in irrigation.

The ornamental vegetable garden presented in Fig. 3, was designed in an ecological system, by applying the technology of intercropping systems. It has a classic design, representing an attraction point and a spot of color in the same time, in a family garden.



**Fig. 3** - Ornamental vegetable garden

The varieties of lettuce, May King and Lollo Rossa developed well, in the metrological conditions during spring time, and presented specific variety characteristics. The biometric indicators represented by head and rosette diameter, height, weight and number of leafs, that can be seen in table 1, were compared with the result obtained by Hoza Gheorghita in his study regarding edible ornamental carpets, in which chemical fertilization NPK was used (Hoza, 2012). As oppose to that, in the case of intercropping system, with no fertilizer being applied, May King lettuce had an average diameter of 33,81 cm compared to 34,50. Lollo Rossa variety had an average diameter of 26,33 cm as opposed to 28,8. The average weight of the two varieties of lettuce was 242,55 g for Lollo Rossa and 444,36 g for May King.

Table 1

| Biometric aspects of the edible part |                       |                    |                     |
|--------------------------------------|-----------------------|--------------------|---------------------|
| Type                                 | Average diameter (cm) | Average weight (g) | Average height (cm) |
| Lollo Rossa                          | 26,33                 | 242,55             | 19,77               |
| May King                             | 33,81                 | 444,36             | 16,36               |

The number of leafs for the two varieties was between 21-30 for Lollo Rossa and 35-48 for May King head lettuce.

The establishment of an ornamental vegetable garden has the purpose to decorate, but also the purpose to heal (hortitherapy garden) and to nourish. The association of vegetables with flowers creates color, shape and volume effects, integrating the vegetable garden in the family garden frame.

## CONCLUSIONS

1. By taking into consideration the biological and ecological needs of the species *Lactuca sativa* L., the plant was well developed.
2. The variation of form and color, given by the associated species in intercropping system, has increased the ornamental effect of the vegetable garden.
3. Growing ecologic lettuce in intercropping system has results in an increase of biodiversity and a decrease of weeds, in the vegetable garden.
4. By associating vegetables with flowers benefic insects were attracted.
5. The geometric style of the design has allowed the usage of a large number of plants on a relative small area.

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