THE EFFECT OF BEDDING PLANTS (*TAGETES ERECTA* AND *ANTIRRHINUM MAJUS*) IN THE URBAN LANDSCAPE ARCHITECTURE

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ABSTRACT
The purpose of our work was the study of characteristics of flowering stage, ornamental values and used bedding plant (*Tagetes* and *Antirrhinum*) cultivars as integral components in landscape architecture and urban design in Kosovo.
Ornamental plant production in the Republic of Kosovo has a seventy years old tradition. Production of ornamental plants is mainly performed under protected environment while the production of ornamental trees, shrubs, rose seedlings is organized outdoors. Primarly grown are cut flowers, roses, gerbera, carnations, bedding plants, etc. Two bedding plants with five cultivars have been studied: *Tagetes erecta* 'Lemon Mum', *Tagetes eracta* 'Kilimanjaro White' and *Antirrhinum majus* 'Sonnet', *Antirrhinum majus* 'Black Prince' etc. During the vegetation were measured: blooming seasons, number of flowers, diameter of flowers, colour and length of growth.
The cultivars studied have a rich range of colors in garden, from white, yellow, green, dark red, etc. Blooming time depends on cultivar, and it begins for *Tagetes* and *Antirrhinum* cultivars in May and continues until October. Bedding plants have manifested high decorative values in urban landsacape under the Kosovo climate condition.

Key words: Kosovo, bedding plant, landscape design, *Tagetes*, *Antirrhinum*

INTRODUCTION

In the Republic of Kosovo there is an increased the tendency for environmental regulation with different ornamental plants, in parallel with the expansion of urban centers, large cities, new houses, residential areas. *Tagetes* and *Antirrhinum* species are the most popular bedding plants grown in Kosovo (BALAJ, 2010).
The urban green spaces influence the social, economical and environmental politics, contributing in several ways to the quality of life, affecting directly the livability of the city. Landscape trees and shrubs, bedding plants, foliage plants, flowering potted plants and cut flowers have long been appreciated for their contributions to the quality of the environments in which we live and work.
Bedding plants can be annuals, biennials or perennials. Annuals are plants which are grown from seed, produce flowers and seed and die in one growing season. Bedding plants with their seemingly infinite variety of flower color and plant form fit into almost any landscape situation (VUKSANI, 2004).
The importance of urban green spaces has been known for decades; however the relationship between urban live ability and green areas as incorporated in overall urban green structures has become the focus of international studies especially during the last 10 to 15 years (TZOULAS AND JAMES, 2004).

Many bedding plants bloom during the winter months, contributing splendidly to a colorful landscape and producing flowers for home decorations. Others grow and flower during the trying months of June, July, August and September, persistently blooming through the heat and heavy summer rains (ARMITAGE, 1994).

Tagetes erecta L. and *Tagetes patula* L. belong to the family of *Asteraceae*. They originated from Central America, mainly distributed in western Mexico and southeastern Arizona Nowadays, the species widely used throughout the world are *T. erecta* L., *T.patula* L. and *T. tenuifolia* (DOULE, 2005).

The purpose of our work was the study of characteristics of flowering stage, ornamental values and used bedding plant (*Tagetes* and *Antirrhinum*) cultivars, as integral components in landscape architecture and urban design in Kosovo.

MATERIAL AND METHOD

During the 2010-2011 period, the subjects of the research in our experimental field (*Figure 1*), two bedding plants with five cultivars have been studied: *Tagetes erecta* 'Lemon Mum','Kilimanjaro White','Antigua Yellow', 'Jubilee Diamond', 'Safari Yellow' and *Antirrhinum majus* 'Sonnet','Black Prince', 'Madame Butterfly', 'Sweetheart Series', 'White Wonder'. Plants were planted in the period from 20.04.2010 – 25.04.2010. The experimental design was 'randomized block' with four replications and 200 plants for each variety. Distance of planting was 35 x 25 cm. The growth period and flowering stage of the plants in urban landscape design were studied from April to November under Kosovo climate conditions. All the species were investigated for the main morphological and decorative characteristics: blooming time, color of flowers, plant height, length, number of flowers, mean florets diameter and number of florets open in the same time. Kosovo is located in the central part of Balkan. It lies between 41°50'58" and 43°51'42" of northern geographic latitude and between 20°01'3" and 21°48'02" of eastern geographic length. Kosovo has an area of 10,908 km^2. The climate is continental-like, with a dominant influence of Adriatic-Mediterranean climate in Dukagjini Plane, through the valley of Drin i Bardhe.

Figure 1. Experimental field of plants types in the study (*Tagetes erecta* and *Antirrhinum majus*) cultivars

RESULTS

Morphological characteristics and blooming period of *Tagetes erecta* cultivars

Morphological characteristicts and blooming period of *Tagetes erecta* cultivars are presented in *Table 1:*

- Plant height
The average value for this parameter was 64.6 cm, the most vigorous being 'Safari Yellow' (73 cm), 'Antigua Yellow' (70 cm) followed by 'Jubilee Diamond', while the cultivar 'KilimanjaroWhite' was less vigorous (55 cm).

- Flower diameter
Flowers diameter is one of the most important qualitative characteristics of ornamental plants. From the results of the study for five cultivars it is demonstrated that the size of the flowers is different and it is an essential feature of the cultivar. The largest diameter of flowers has been achieved at the cultivar 'KilimanjaroWhite' (5.5 cm) and the cultivar 'Yellow Antigua' has a smaller diameter of flowers (4.2 cm). Other cultivars are with a diameter of flowers in the average value between them.

- Floral stem
The length of the floral stem was between 35.5 cm 'KilimanjaroWhite' and 30.3 cm 'Jubilee Diamond'. This property is very important for cut flowers and the vigorous cultivars can also be used as individuals or in plant groups in landscape design. The average value of this character was 32.6 cm.

- Color of flowers
The cultivars studied have a range of colors from white ('Kilimanjaro White', 'Jubilee Diamond') and yellow ('Antigua Yellow', 'Safari Yellow') to orange ('Lemon Mum'). There is a large variation of varieties associated with the intensity of colors and have beautiful views of gardens.

- Number of flowers/plant
The cultivars under study show a number of flowers per plant between 118.3 and 95.3. The greatest number of flowers per plant was at the 'Safari Yellow' (118.3), while the smallest number of flowers per plant was at the 'Jubilee Diamond' (95.3) cultivar. The average value of this character was 110.4 flowers per plant.

Table 1. Morphological characteristics of *Tagetes erecta* cultivars

Cultivars	Color of flower	Height of plant (cm)	No. of flowers/ plant	Floral stem (cm)	Diameter of flower (cm)
'Lemon Mum'	Orange	65	105.0	31.3	4.5
'KilimanjaroWhite'	White	55	123.3	35.5	5.5
'Antigua Yellow'	Yellow	70	110.5	31.5	4.2
'Jubilee Diamond'	White	60	95.3	30.3	5.1
'Safari Yellow'	Yellow	73	118.3	32.7	4.7

Dynamics of the blooming period according to the cultivar

For all cultivars the blooming begins in May. There exist different number of flowers (2-3) per plant. The number of flowers per plant begins to increase in June and the highest is achieved at the cultivar 'Yellow Safari' (12), while the lowest one at the cultivar 'Yellow' (10). Maximum blooming (the largest number of flowers) is achieved in July and August, depending on the cultivars; the highest was recorded at the cultivar 'Diamond Jubilee' with 41 flowers per plant, the lowest one with 38 flowers at the cultivar 'Diamond Jubilee'. Blooming ends in late October or early November depending on the decrease of temperature. The smallest number of flowers was detected at the cultivar 'Lemon Mum' with 1 flower per plant and the highest at cultivar 'Safari Yellow' with 3 flowers per plant (*Figure 2a*).

a) **b)**

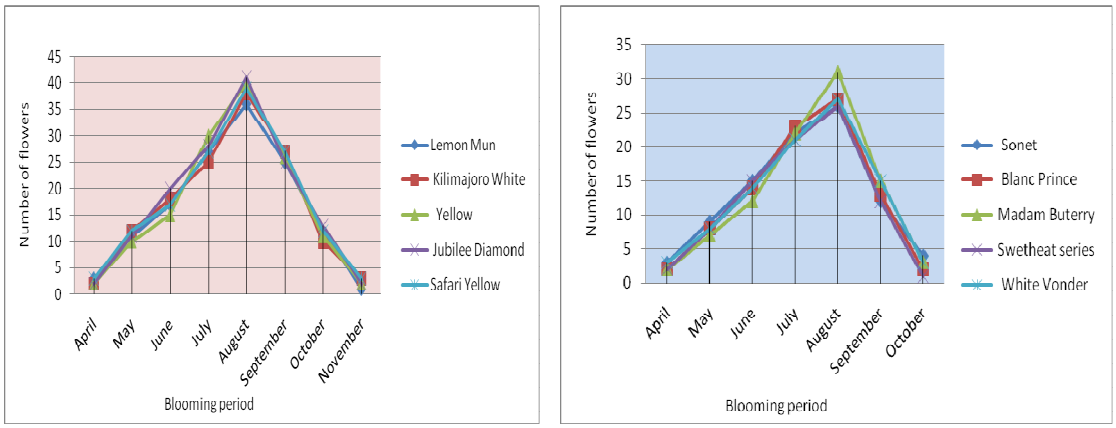

Figure 2. Flowering period of the *Tagetes* (a) and *Antirrhinum* (b) cultivars

Morphological characteristics and blooming period of *Antirrhinum majus* cultivars

Morphological characteristics and blooming period of *Antirrhinum* cultivars are presented in *Table 2*:

- Plant height

The plant height of *Antirrhinum* cultivars was over 50 cm, the most vigorous being ‘Madame Butterfly’ (63 cm) followed by ‘Black Prince’ (53 cm), while the cultivars ‘Swetheart Series’ were less vigorous (48 cm). The average value for this parameter was 52.3 cm.

- Color of flowers

The cultivars studied have a range of colors from white (‘White Wonder’), yellow (‘Sweetheart Series’), rose (‘Sonnet’) to red ('Black Prince' and ‘Madame Butterfly’).

- Number of flowers/plant

The cultivars under study show a number of flowers per plant between 50 and 65. The greatest number of flowers per plant was at 'Black Prince' (65), while the smallest number of flowers per plant was at ‘Madame Butterfly’ (48). The average value of this character is 54.6 flowers per plant.

Dynamics of the blooming period of the *Antirrhinum* cultivars is presented in *Figure 2b*. For all *Antirrhinum* cultivars the blooming begins in May, while blooming ends in late October or early November depending on the decrease of temperature.

Table 2. Morphological characteristics of *Antirrhinum majus* cultivars

Cultivars	Color of flower	Height of plant (cm)	No. of flowers/ plant	Floral stem (cm)	Diameter of flower (cm)
‘Sonnet’	Rose	45	55	25	4.3
'Black Prince'	Red	53	65	30	4.2
‘Madame Butterfly’	Red	63	48	35	3.8
‘Swetheart Series’	Yellow	48	55	34	4.0
‘White Wonder’	White	52	50	29	3.7

CONCLUSIONS

From our study and the obtained results it is proved that the studied species (*Tagetes erecta* and *Antirrhinum majus*) have a very good blooming due to favourable climatic conditions in Kosovo, which affected the growth, quality and colour of the flowers. Hybrids of species of flowers like *Tagetes* and *Antirrhinum*, have demonstrated high decorative value and long period with flowers, good growing, leaves and flowers of different colours (white, red, yellow, pink, etc.). There is variability among cultivars, in terms of number of flowers and blooming period. In all cultivars, blooming begins in May with various number of flowers (2-4) per plant. The maximum blooming (the largest number of flowers) is achieved in July and August, while the blooming ends in late of October. The studied cultivars have an impact on urban landscape architecture, achieving the maximum aesthetic appearance, with beautiful colours (leaves, flowers) at homes or in urban environments. For a good architecture of the urban landscape, the studied cultivars of *Tagetes* and *Antirrhinum* species should be included in the planting structure.

ACKNOWLEDGEMENTS

It is my honour to express my gratitude and thank all the staff of the Faculty of Agriculture, Department of Horticulture of the Agricultural University of Tirana. In particular I would like to thank the Scientific Leader Prof. Dr. Llazar Haxhinasto, who with high dedication and without hesitation helped me in setting up the experiment and fieldwork. Furthermore, it is my pleasure to thank all my colleagues and friends from Albania and Kosovo, for the readiness and their support they shown in my address, in order to conclude this study. I thank the horticulturist centre Alb-flora, who enabled the establishment of the experiment.

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