

**THE DYNAMICS OF PIGMENT CONTENT
IN TWO SPECIES OF MARIGOLD (*CALENDULA OFFICINALIS* L.)**

**DINAMICA CONȚINUTULUI DE PIGMENȚI
LA DOUĂ SOIURI DE GĂLBENELE (*CALENDULA OFFICINALIS* L.)**

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Abstract: *The marigold is a very useful species of medicinal plants with many uses in phyto-therapy and cosmetics. The carotenoid pigments in the marigold's inflorescence represent a fundamental constituent of drugs. The paper examines the dynamics of the pigment content in leaves and inflorescence in two marigold cultivars, the Comun and Bellezza del Pacifico, with yellow and orange flowers, respectively. The pigment content was measured by spectrophotometry. The results point out a maximum carotenoid pigment content with maximum light absorption in 425-426 nm and 447-447nm in the orange flower cultivar (the Bellezza del Pacifico cultivar), which pleads for its introduction into cultivation.*

Rezumat: *Gălbenelele (*Calendula officinalis* L.) sunt o foarte valoroasă specie de plante medicinale, cu utilizări multiple în fitoterapie și cosmetică. Pigmenții carotenoizi din inflorescența de gălbenele reprezintă un component principal al medicamentelor. Lucrarea prezintă dinamica conținutului de pigmenți în frunze și inflorescențe la două soiuri de gălbenele, și anume soiul Comun și soiul Bellezza del Pacifico, cu varietatea cu flori galbene și respectiv portocalii. Conținutul de pigmenți a fost determinat prin metoda spectrofotometrică. Rezultatele evidențiază un conținut maxim de pigmenți carotenoizi cu absorbție maximă în 425-426 nm și 447-448 nm la varietatea cu flori portocalii a soiului Bellezza del Pacifico, ceea ce pledează pentru introducerea sa în cultură.*

Key words: *marigold, medicinal herbs, carotenoid pigments, Bellezza del Pacifico variety*
Cuvinte cheie: *gălbenele, plante medicinale, pigmenți carotenoizi, soiul Bellezza del Pacifico*

INTRODUCTION

The marigold (*Calendula officinalis* L.) is a very valuable species of medicinal plants with various uses in phytotherapy and cosmetics (Grainger Bisset N., 1994, Robu T., Milică C., 2004). The carotenoid pigments represent a main compound of the marigold inflorescence drug (Grainger Bisset N., 1994, ROBU T., MILICĂ C., 2004). Recent research (Navrotescu Tinca Mioara et al., 2005; Tamaș V., Neamtu G., 1-2, 1986) refers to the study of these pigments and to the initiation of marigold cultures (Grădilă Marga, 1998, p202-206).

MATERIAL AND METHOD

The dynamics of the pigment content in leaves and inflorescences was studied for two varieties of marigolds (*Calendula officinalis* L): the Common and *Bellezza del Pacifico* variety with the assortments with yellow and orange flowers) cultivated on the experimental field of the University of Agricultural Sciences and Veterinary Medicine of Iași.

The content of pigments in leaves and inflorescences was determined by means of the spectrophotometric method with computerized reproduction, by determining the capacity of light absorption by the acetone extract (1%) in the blue and red regions of the visible spectrum which characterizes the wavelengths with maximum absorption for chlorophyll (431-432 nm, 453-454 nm, 662-663 nm) and carotenoid pigments (425-427 nm and 447-448 nm).

RESULTS AND DISCUSSIONS

The analysis of the pigment content of the marigold leaves, measured by their capacity of light absorption, demonstrates that the maximum light-absorbing capacity of leaves characteristic to the photosynthetic pigments is obvious, both for chlorophyll a (662-663 nm in the region with red radiations and 431-432 nm in the region with blue radiations) and for chlorophyll b (453-454 nm) in the region with blue radiations in all experimented variants.

The values of the three types of pigments are minimal in the Common and maximal in the *Bellezza del Pacifico* variety with yellow flowers. The results demonstrate a higher photosynthetic capacity in the two assortments of the *Bellezza del Pacifico* variety than that of the Common variety (fig. 1).

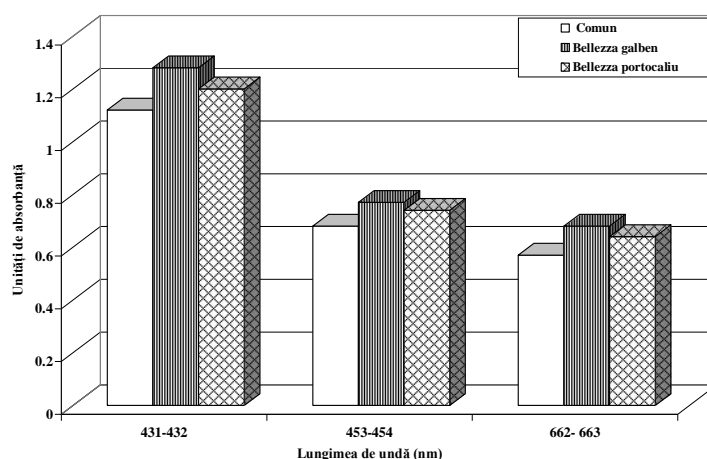


Figure 1 Light absorption by the acetone extract of pigments (1%) from the leaves in the blue and red areas of the visible spectrum (recipient 10 nm)

The obtained results regarding the mature inflorescences demonstrate the almost total disappearance of the chlorophyll and the significant accumulation of carotenoid pigments with maximum absorption in the region with blue radiations of the visible spectrum (425-427 nm and 447-448 nm) (fig. 2).

Tamaș and Neamțu (1986) quote these maximum values as being characteristic to the carotenoid pigments extracted by acetone, especially the α -carotene. Different authors have marked out the carotenoid pigments in the acetone extract from the marigold inflorescences. The obtained results in the different experimental variants present a maximum content of carotenoids in the inflorescences of the *Bellezza del Pacifico* variety with orange flowers, which pleads for their initiation in marigold cultures.

The results obtained concerning the inflorescence bud reveal the decrease of the content of chlorophyll a with absorption in the wavelength 662-663 nm, i.e. it is a compound of the reaction centre of the photosynthetic system (fig. 3).

The compound of the centre of absorption of the light in the photosynthetic system – the chlorophyll a species 431-432 nm has a high content parallel to the biosynthesis of the carotenoid pigments.

In the experimented variant, lower values of the pigments with maximum absorption in the blue region of the visible spectrum were registered in the assortments of the *Bellezza del Pacifico*, than those of the Common variety. The lower values of the contents of chlorophyll a with maximum absorption in the wavelengths 431-432 nm demonstrate a higher precocity degree and an earlier blossom in this variety, than in the Common variety.

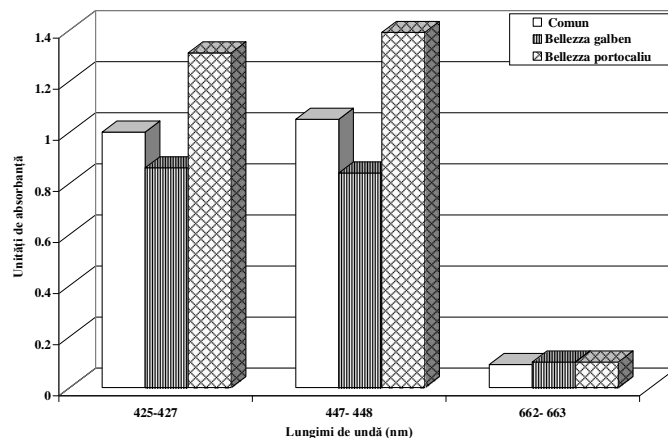


Figure 2 Light absorption by the acetone extract of pigments (1%) from the inflorescences in the blue and red areas of the visible spectrum (recipient 10 nm)

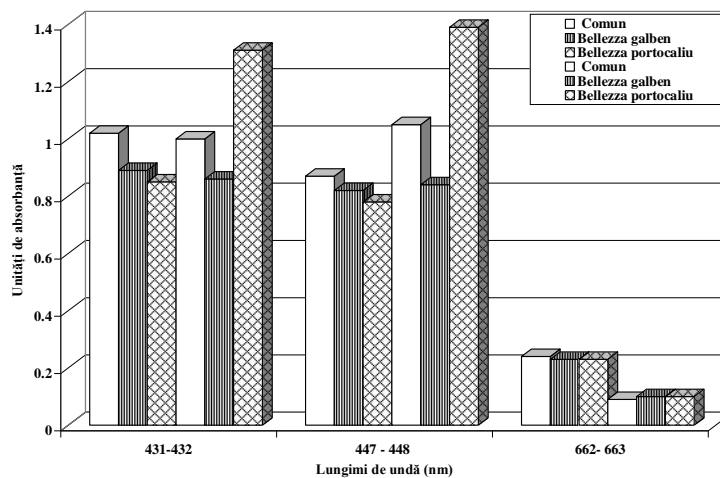


Figure 3 Light absorption by the acetone extract of pigments (1%) from the buds in the blue and red areas of the visible spectrum (recipient 10 nm)

CONCLUSIONS

1. The values of the content of photosynthetic pigments in the marigold leaves reveal a higher photosynthetic capacity in the assortments of the *Bellezza del Pacifico* than those of the Common variety.

2. The values of the content of pigments in the inflorescences reveal the decrease in the content of photosynthetic pigments and the accumulation of carotenoid pigments.

3. The maximum content of carotenoid pigments, a main component of the drug in marigolds, is maximal in the inflorescences of the *Bellezza del Pacifico* variety – the orange assortment – which pleads for their initiation of marigold cultures.

LITERATURE

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