

RESEARCHES ON THE CAROTENOID PIGMENT CONTENT, A COMPONENT OF THE PHARMACEUTICAL REMEDIES, IN MARIGOLD (*CALENDULA OFFICINALIS* L.)

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Abstract: The content of some pigments in marigold (*Calendula officinalis* L.) plants was carried out. In leaves there is a characteristic content of photosynthetic pigments, that includes the carotenoids, with the pics of light absorption in blue-indigo-violet zone of 431-432, 453-454 nm. The flowering heads accumulate different carotenoid pigments, with the pics of light absorption in wavelength of 425, 446-48 and 465 nm. The content of carotenoids is higher in orange than in yellow variety.

INTRODUCTION

The marigold (*Calendula officinalis* L.) is an annual or biennial plant, with broadly lanceolate leaves and flowering heads orange-yellow (the diameter: 5-7cm), with ligulate and tubular florets. Marigold flowering heads (*Flores Calendulae*) is a drug, a component of many medicinal herbal mixtures, but the extracts are present in many prepared remedies.

Preparations of the drug inhibit inflammations of the skin and mucous membranes and promote wounds healing. The internal use has an antiinflammatorial and antimicrobial action, a choleric and cholagogues effect. The main constituents of the drug are essential oils, like: menthone, gama-terpinene, caryophyllene, geranylacetone, carvone etc, saponins, sesquiterpenes, flavonoid glycosides, alcohols, bitter substances, carotenoid pigments like carotens and xanthophylles (Ciulei et. al, 1993 ; Grainger ,1994 ; Radu , Andronescu , 1984).

In this paper, the dynamics of chlorophylls and carotenoid pigments in marigold (*Calendula officinalis* L.) leaves and heads was analyzed.

MATERIAL AND METHOD

The researches were carried out on the marigold (*Calendula officinalis* L.) plants cultivated in the Didactical Station of the University of Agronomical Sciences in Iași. Two varieties were tested, with yellow and orange flowers respectively. The accumulation of the carotenoid pigments in flowering heads was tested in june and july. The contend of chlorophyll and carotenoid pigments content in plant was tested in july, during flowering in leaves and flowering heads. The pigment content was appreciated by the light absorption capacity from 1% acetone extract in spectrophotometer.

RESULTS

A comparison between carotenoid pigment content in marigold flowering heads in june and july is presented in table 1. The results demonstrate that acetone extract absorbed the light in blue-indigo-violet zone of the visible spectrum, the main pics are in wave length of 425, 446-48 and 468 nm. The highest values are in wavelength of 446-48 nm and 425 nm, respectively.

In yellow flowers variety these values are the same both in june and july, but in orange flowers variety the content of these pigments increases semnificatively from june

to July. The content of the pigments with the peaks in wavelength of 468 nm increases from June to July in both varieties, too. The content of the photoreceptors that absorbed the light in UV radiation with the wavelength of 335 nm is not quite different in the two varieties, but increases from June to July. These pigments are recognized to be iso-flavonoid substances that have in plants an action of protection against biological agents of stress (Hopkins W.G, 1995).

Table 1. Light absorption by the pigment acetone extract (1%) of the marigold mature heads (units of absorbency)

| Variety | Month | Wave length (nm) | | | |
|---------|-------|------------------|------|--------|------|
| | | 335 | 425 | 446-48 | 468 |
| Yellow | June | 0,88 | 2,20 | 2,50 | 1,40 |
| | July | 1,10 | 2,15 | 2,50 | 1,73 |
| Orange | June | 0,88 | 2,20 | 2,18 | 1,36 |
| | July | 0,90 | 2,62 | 2,74 | 1,79 |

The content of the chlorophyll and carotenoid pigment content in July, during flowering in leaves and flowering heads is presented in table 2.

Table 2. Light absorption by the pigment acetone extract (1%) of the marigold leaves and heads (units of absorbency)

| Variety | Plant organ | Wave length (nm) | | | | | | | |
|---------|-------------|------------------|------|--------|--------|--------|------|------|------|
| | | 335 | 425 | 431-32 | 446-48 | 453-53 | 468 | 616 | 663 |
| Yellow | Leave | 0,40 | - | 0,88 | - | 0,52 | - | 0,11 | 0,88 |
| | Young head | 0,70 | - | 0,52 | - | - | - | 0,88 | 0,15 |
| | Mature head | 1,10 | 2,15 | - | 2,50 | - | 1,73 | - | - |
| Orange | Leave | 0,60 | - | 1,34 | - | 0,78 | - | 0,16 | 0,74 |
| | Young head | 0,76 | - | 0,92 | 0,92 | - | - | 0,05 | 0,18 |
| | Mature head | 0,90 | 2,62 | - | 2,74 | - | 1,79 | - | - |

The results demonstrate that in leaves there are characteristic photosynthetic pigments that absorb the light in visible spectrum, mainly in wave length of 663 nm and 431-32, 453-54 nm, respectively. In this last zone there are carotenoids like photosynthetic pigments (Hopkins W.G, 1995).

In the young flower heads the content of the chlorophylls decreases strongly, and the carotenoids that absorbed the light in wave length of 446-48 nm appear in orange variety. In the mature flower heads the content of chlorophyll disappears entirely, and the characteristic carotenoid pigments absorb the light in wavelength of 425, 446-48 and

468 nm, respectively. The content of the carotenoid pigment is higher in orange than in yellow variety. The content of photoreceptors in UV increases strongly from the leaves to mature flowering heads, especially in yellow variety.

CONCLUSIONS

In marigold leaves there is a characteristic content of photosynthetic pigments, that includes the carotenoids, with the pics of maximum light absorption in blue-indigo-violet zone of 431-32, 453-54 nm.

The mature flowering heads accumulate different carotenoid pigments, with the pics of maximum light absorption in wavelength of 425, 446-48 and 465 nm and the photoreceptors in UV. This content of carotenoids is higher in orange than in yellow variety.

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