ALTHAEA ROSEA, AN OPPORTUNITY IN THE INDUSTRY OF FOOD COLORANTS

ALTHAEA ROSEA, O OPORTUNITATE ÎN INDUSTRIA COLORANȚILOR ALIMENTARI

ROMAN Camelia Nicoleta
University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

Abstract. *In this paper, Althaea rosea was analyzed both from the physiologic viewpoint and the biochemical one. During the growing and development of the plant we determined: the number of leaves/plant, the plant height, the number of flowers/plant, the flower production with and without calyx/plant. From the biochemical viewpoint we determined: the soluble dry substances, titrating acidity, reducing glucides and the anthocian contents.*
Key words: natural pigments, flowers, *Althaea rosea*

Rezumat. *În prezenta lucrare, Althaea rosea a fost urmărită atât din punct de vedere fiziologic, cât şi din punct de vedere biochimic. Pe parcursul creşterii şi dezvoltării plantei s-au determinat: numărul de frunze/plantă, înălțimea plantei, numărul de flori/plantă, producția de flori cu (şi fără) caliciu/plantă. Din punct de vedere biochimic au fost determinate: substanța uscată solubilă, aciditatea titrabilă, glucidele reducătoare şi conținutul de antociani.*
Cuvinte cheie: pigmenți naturali, flori, *Althaea rosea*

INTRODUCTION

The research themes focused on the putting to good use of some raw materials insufficiently studied so far to extract natural colorants represent a priority domain at world level, so much the more at national level for the following reasons: it may determine the increase of health benefits by consuming healthier products colored with natural pigments, it may ensure the obtaining of some new natural products of the type of anthocian pigments useful in coloring foodstuffs, one may improve the nutritional value of some specific foodstuffs having a superior protective effect on the body, unlike the use of synthesis colorants that may cause certain diseases (cancer, allergies); we will investigate the local potential from Romania's NE economic area.

The orientation of consumers' demands towards products as ecologic as possible led to the extension of researches on plants with tinctorial proprieties. Among these, the specialized literature presents *Althaea rosea* as a plant with widely colored flowers that has been recently studied for the extraction of natural pigments and their use in the food industry. At present, the flowers are used as a colorant to correct wine color, to colour and flavour vinegars, to color liquors and syrups.

MATERIAL AND METHOD

Althaea rosea was cultivated on the didactic experimental field. In 2007, we seeded: **Black Hollyhock** (with simple black flowers), **Chateris Double Scarlet** (with red double flowers) and **Violet Queen** (with purple double flowers).

The cultivation technology was the one recommended by the specialized literature.

The flower harvest was made gradually, in 3 stages, during blooming. After each harvest, the flowers were weighed with and without chalice and then they were dried. For the biochemical analyses we used the dried flowers without a chalice.

In the first year of culture we made the following observations: the date of spring (when 75% of plants came out from the earth) and the number of leaves in rosette at the end of the 1^{st} year of culture. In the 2^{nd} year we watched: the medium height of plant, the average number of leaves/plant, the average number of flowers/plant, the average yield of flowers with (and without) a chalice/plant.

In the 2^{nd} ear of culture we also analysed flowers from the biochemical viewpoint and determined: the soluble dry substance, titrating acidity, reducing glucides and the anthocian content.

The soluble dry substance was determined by the refractometric method, using the Zeiss handheld refractometer.

The determination of titrating acidity was base don the reaction of neutralization with alkaline solutions up to the equivalence point. Since we talked about some acidity due first to the organic acids that are weak acids, we used an indicator the thymol blue, a special indicator for colored extracts. The result was expressed in milliliters of sodium hydroxide n/10 entered in titration.

The reducing glucides were determined by Schoorl titrimetric method, by hot extraction, liming with basic lead acetate and titration with a solution from sodium tiosulphate.

The anthocian content was determined by the pH variation method. The variation of the coloring intensity between tow values of pH is proportional to the anthocian content. We chose pH=0.6 and pH=3.5. By this variation, the phenolic function is not affected and it is admitted that the other phenolic compounds do not interfere with the determination. The expression of anthocian content is made by means of the calibrating plot traced on the basis of the difference of absorbance between the two solutions analysed.

RESULTS AND DISCUSSIONS

Althaea rosea is a biennial plant, in the first year it has a leaf rosette and in the second year it has flowery stems, flowers, fruits and seeds. Despite being a biennial plant, in conditions of culture it may be transformed in a perennial plant, but with a decrease of the flower yield.

The results of the phenological and biometric observations are presented in table 1.

From the analysis of the phenological and biometric observations, we may characterize the three species under study (table 2).

The results of the biochemical analyses for dry flowers without chalice were registered in table 3.

Form the analysis of the biochemical results under study, species may stand out depending on the average of these results (table 4).

Table 1

Phenological and biometric observations

Observations	Black Hollyhock	Violet Queen	Chateris Double Scarlet
Germinative capacity (%)	73	89	76
Spring	17 VI	14 VI	19 VI
Number of leaves per rosette in the 1st year	12	8	11
Medium height of plant (cm)	185	173	197
Average number of leaves per plant	54	38	61
Average number of flowers per plant	30	21	32
Average yield of fresh flowers with chalice per plant (Kg)	0.35	0.19	0.37
Average yield of fresh flowers without chalice per plant (Kg)	0.28	0.15	0.31

Table 2

Characterization of the cultivars under study from the viewpoint of biometric observations as compared to the culture average

Biometric observations	Black Hollyhock (%)	Violet Queen (%)	Chateris Double Scarlet (%)
Average of plant height: **185**	100	93.51	**106.48**
Average number of leaves per plant: **51**	105.88	74.50	**119.60**
Average number of flowers per plant: **27**	109.52	73.80	**116.66**
Average yield of fresh flowers with chalice per plant: **0.33 Kg**	108.75	76.25	**116.25**
Average yield of fresh flowers without chalice per plant **0.24 Kg**	107.93	82.53	**111.11**

From the results recorded in Tables 1 and 2 we can say that variety Chateris Double Scarlet has a vigorous growth, with the greatest number of flowers and leaves and the highest production.

At the other extreme, has been the variety Violet Queen. With an average height less than 30 cm and a number of leaves almost half that of the variety Chateris Double Scarlet, it recorded the lowest indices of production, as 20% compared to the average of varieties studied.

We can say that the variety Blak Hollyhoc noted that standard, the values recorded biometric determinations are very close to the average of the three species taken in culture.

Table 3

Results of the biochemical analyses for dry flowers without chalice

Biochemical analyses	Black Hollyhock	Violet Queen	Chateris Double Scarlet
Soluble dry substance (^{0}Brix)	19.6	18.9	18.3
Titrating acidity (ml Na OH)	0.7	1.2	1.1
Reducing glucides (g/100g product)	31	34	28
Anthocian content (g/100g product)	2.35	2.27	1.98

Table 4

Characterization of the cultivars under study from the viewpoint of the biochemical analyses effectuated on the dry flowers without a chalice

Biochemical analyses	Black Hollyhock (%)	Violet Queen (%)	Chateris Double Scarlet (%)
Soluble dry substance Average = **18,93**	**103.53**	99.84	96.51
Titrating acidity Average = **1**	70	**120**	110
Reducing glucides Average = **31**	100	**109.67**	90.32
Anthocian content Average = **2,17**	**108.29**	104.60	91.24

Analyzing tables 3 and 4 we can say that flowers were harvested at the optimum moment, the signs of aging results from the three varieties studied joining in the literature data.

Of biochemical results are seen as the ratio between the three varieties are changing. Variety Chateris Double Scarlet passes last place in terms of content of anthocyanins, the first being the Black Hollyhock variety and variety Violet Queen in second place.

CONCLUSIONS

From the analysis of the results of the biometric and phenological observations, we may draw the following conclusions:

1. Violet Queen breed had the highest germinative capacity (89%) and sprang 3 days before Black Hollyhock breed and 5 days before Chateris Double Scarlet breed.

2. Chateris Double Scarlet breed registered the highest values above averages for all the biometric observations effectuated: medium height of plant (106.48%), average number of leaves per plant (119.60%), average number of flowers per plant (116.66%), average yield of flowers with chalice per plant (116.25%) and average yield of flowers without chalice per plant (111.11%), what recommends it in terms of flower yield.

3. Black Hollyhock breed also integrates a little above the averages of the values accumulated, being recommended for the flower yield.

From the analysis of the results of the biochemical analyses effectuated on the dry flowers without a chalice, we may draw the following conclusions:

1. Violet Queen breed registered values above average in terms of the content of reducing glucides and titrating acidity.

2. Black Hollyhock breed registered values above average in terms of the content in soluble dry substances and anthocian accumulation.

Due to the accumulation of a large quantity of anthocians (as compared to other cultivated plants), especially in altheine (a mixture of delphinidine and malvidin, lacking toxicity) and the large flower yield, we should study in detail this species to recommend its use on a larger scale in the food and pharmaceutical industry.

REFERENCES

1. **Banu C. şi colab., 1982** – *Produsele alimentare şi inocuitatea lor.* Editura Tehică, Bucureşti
2. **Banu C., 1992** - *Progrese tehnice, tehnologice şi ştiinţifice în industria alimentară* Editura Tehnică, Bucureşti
3. **Bordea Mariana şi colab., 1998**- *Vitaminizarea naturală a organismului şi sănătatea.* Editura Sport- Turism, Bucureşti
4. **Cheftel J.C. şi colab**., **1992** - *Introduction a la biochimie et a la technologie des aliments.* vol.I, Editura Tec&Doc- Lavoisier, Paris
5. **Dejica D. şi colab., 2001 -***Antioxidanţi şi terapie antioxidantă* **.** Editura Casa Cărţii de Ştiinţă, Cluj-Napoca
6. **Derache R, 1986** – *Toxicologie & securite des alimentaires. Editura TEC&DOC, Lavoisier, Apria, Paris*
7. **Dimitriu C., 1980** – *Metode şi tehnici de control ale produselor alimentare şi de alimentaţie publică.* Editura CERES, Bucureşti
8. **Gherghi A. şi colab. 2001**- *Biochimia şi fiziologia legumelor şi fructelor*. Editura Academiei Române, Bucureşti
9. **Gherghi A., 1999**.- *Prelucrarea şi industrializarea produselor horticole*. Editura Olimp, Bucureşti
10. **Gilles A. Şi colab., 1997** – *Ecolochimie. Chimie appliquee a l'environnment*. Editura Cultures et Technoloques, Nantes
11. **Grădilă M., 1998** – *Cultura plantelor tehnice şi medicinale*, Editura M.A.S.T., Bucureşti
12. **Luca C., Duca Al., Criţan I. Al., 1983** - Chimie analitică şi analiză instrumentală, Editura Didactică şi Pedagogică, Bucureşti
13. **Magearu V., 1988** – *Controlul analitic al produselor biotehnologice*. Editura Tehnică, Bucureşti

14. Neamțu G., 1997 – *Biochimie alimentară*. Editura CERES, Bucureşti
15. Păun C., 2004 – *Enciclopedia plantelor (vol.III). Plante din Flora României*. Editura Tehnică, Bucureşti
16. Segal B. şi colab., 1982- *Analiza senzorialã a produselor alimentare*. Editura Tehnică, Bucureşti
17. Segal Rodica şi colab., 1985 – *Determinarea calității produselor alimentare*. Editura CERES, Bucureşti
18. Temelie Mihaela, 2005 – *Enciclopedia plantelor medicinale spontane din România*, Editura Rovimed Published, Bacau
19. Thomson R.H, 1993 – *The Chemistry of natural products*. Editura Blackie Academia & Proffesional, London, New York, Tokyo, Melbourne
20. Toma Liana-Doina, 1998 – *Fiziologia plantelor ornamentale*. Editura Ion Ionescu de la Brad, Iaşi
21. *, 2008** - Colecția de stasuri ASRO pentru analize chimice şi biochimice.