

THE VARIABILITY OF THE CAPACITY IN ACTIVE ORIGINS OF SUBTERANEUS ORGANS IN SELECTED FAMILYS BY *GENTIANA LUTEA* L.

VARIABILITATEA CONȚINUTULUI DE PRINCIPII ACTIVE ALE ORGANELOR SUBTERANE ALE FAMILIILOR DE *GENTIANA LUTEA* L. SELECȚIONATE

POP M. R., CAMELIA SAND, C.H. BARBU
“Lucian Blaga” University of Sibiu

Abstract. *Gentiana lutea* L is a specie protected by the Romanian laws. The main objective of this study is a research for identifying valuable genotypes and their multiplication for amelioration. Characteristic features of *Gentiana lutea* L highly influences the amelioration methion and also the saw and seeds production technology (Savatti et al., 2004). That is way we decided to study the phonotypical and genetic variability of the selected families, and in the same time to outline the correlations between the analyzed characters for the improvement of amelioration methods. For herbs it is highly important that all the researches to be based on photochemical studies, so to have a solid ground for the steps done. For this reason this article presents the way we establish the concentration of active principles in ground organs of the selected families.

Rezumat. *Gentiana lutea* L. este o plantă monument al naturii, ocrotită de legile române. Obiectivul principal propus în acest sens este inițierea unor cercetări privind identificarea genotipurilor valoroase și înmulțirea lor în scopul ameliorării. Particularitățile biologice ale speciei *Gentiana lutea* L., au influențe majore atât asupra metodei de ameliorare cât și asupra tehnologiei de cultură și de producere de sămânță (Savatti et al., 2004). Din această cauză ne-am propus studierea variabilității fenotipice și genetice a familiilor selecționate, precum și evidențierea unor corelații între caracterele supuse analizei în vederea îmbunătățirii metodelor de ameliorare. La plantele medicinale este imperios necesar ca toate cercetările efectuate să aibă la bază studii fitochimice, pentru a avea o fundamentare solidă a demersurilor întreprinse. Din acest motiv în articolul de față prezentăm stabilirea gradului de variabilitate a conținutului de principii active din organele subterane la familiile selecționate din cadrul speciei luată în studiu.

Gentiana grow better and faster in places with cool climate, with enough humidity. *Gentiana lutea* L habitat is characterized by humid summers, rainy springs and not that frosty winters (Huxley, 1992).

The roots and the rhizomes are cylindrical, sometimes longitudinal cloven, with an external area longitudinal striated (roots) and transverse striated (rhizome). The fracture is granulated, not fibrous, and not mealy. The taste is at the beginning sweetish, and then becomes very bitter (Pârvu, 2003).

After some authors (Kohlein, 1991), the specialized products of metabolism, with a phototherapeutic importance are:

- ✓ Bitners glicozides
- ✓ Flavons glicozides
- ✓ alcoloids
- ✓ sugars
- ✓ volatile oil

Some studies outline the fact that the accumulation of gentiopicroin, bitter principles and fenoli is influenced by the light intensity, but results are obtained on dark areas as well.

MATERIALS AND METHODS

Throughout the period of research, the climate was characterized by a pluviometrical regime, really low and temperatures really high, atmospheric humidity, below 30-35 °C, thing that determined a drying of plants in proportion of 20%. These unfavorable conditions affected also the results of our experiment, but they demonstrated that the most important role is played by the climatic and soil conditions.

The extraction was realized with alcohol at warm (Ciulei et al., 1995). After the removal of the solvent, the residue recommenced several times with warm water, after this the solution was detected with Saturn salt. The plumb surfeit was removed with calcium carbon, after this the aqueous solution was concentrated at low pressure.

0,20 g roots of powdery gentian was vanquish macro sublimate at 120-140°C. It was formed a micro sublimate of acicular crystals, yellow and colorless. After we added 1-2 drops of sodium hydroxide 10% (R) we obtained a golden yellow solution. If the gentian micro sublimate (Ciulei et al., 1995).

0,20g root of powdery gentian macerate with 2ml acetate of ethyl and 0,5 ml of water for 30 min, shaking at interval; 5-6 drops evaporated on a watch glass, and the residue was treated with 1-2 drops of concentrated sulfuric acid and some mg of ammonia. The result is a radish solution which goes to indigo (Ciulei et al., 1995).

RESULTS AND DISCUSSIONS

For determining the variability of the active principles in ground organs of the plant, from the 10th selected families, there were done chemical analysis in the phase of fruits maturation. The analysis reflected the following results:

The results of the analysis showed values more than media, the values being between 0,01-0,03mg and 100g dried texture. The highest values were obtained at G₁ and G₅ families with 0,03mg at 100g dried texture and 0,027m at 100g dried texture. The variability coefficient is $s\% = 34,12$ (see table 2).

The analysis of bitter parameters outline 6 genotypes with high values than the media of experience. The values are situated in the interval between 7700 and 13780, the best performance are met at G₅ and G₉ families, with values between 13780 and 12700.

In table 2 we can see that this character varies, the value of the variability coefficient being $s\% = 20,17$ (table 2), value that gives the possibility to select the direction of this character.

Table 1

Variation of the chemical characteristics in subteraneus organs from the 10 studied families of *Gentiana lutea* L. species

Nr. Crt.	Selected Family	Conținut principii active				
		Gentianin (%)	Gentiopicrozide (%)	Bitterness Index	Volatile oil (%)	Sugars (%)
1.	G-1	0,03	2	11400	0,03	27
2.	G-2	0,01	1,9	8520	0,025	35
3.	G-3	0,015	3,5	10350	0,027	29
4.	G-4	0,02	3	12450	0,028	31
5.	G-5	0,027	2,8	13780	0,035	37
6.	G-6	0,026	2,3	7700	0,025	32
7.	G-7	0,023	2,7	9170	0,027	34
8.	G-8	0,022	2,1	11790	0,029	29
9.	G-9	0,01	2,6	12700	0,032	33
10.	G-10	0,027	2,2	8100	0,02	22
11.	MEDIA	0,021	2,51	10596	0,0278	30,9

Table 2

The direct genetically parameters (the variation, the standard swerve) and derived genetically parameters (variety coefficient) calculated for the morphological characters

The Character	The variation s^2	The standard swerve s	The average \bar{x}	Variety coefficient $s\%$
Gentianin	$5,1 \times 10^{-5}$	0,007	0,021	34,12
Gentiopicrozid	0,25	0,51	2,51	20,09
Bitterness Index	4566071	2136,83	10596	20,17
Volatil oil	$1,7 \times 10^{-5}$	0,004	0,028	14,86
Sugars	18,99	4,36	30,9	14,11

The values for volatile oil was between 0,035ml at 100g vegetal texture and 0,02ml at 100g vegetal texture. Table 2 presents also the value of the variation of this character $s^2 = 1,7 \times 10^{-5}$

and a variability coefficient $s\% = 14,86$, which is a middle level of variability.

Sugars were identified in the concentration of the *Gentiana lutea* L. texture and are shown in table 1, with values between 37g and 100g of vegetal texture and 22g at 100g of vegetal texture. The variability coefficient of this character was $s\% = 14,11$ (table 2).

CONCLUSIONS

From the dates presented in table 2 column 4 we can draw the conclusion that the *Gentiana lutea* L. selected families presented a high value of the variability coefficient (table 2). This gives the image of an interval of variation, that gives the possibility of development of this character.

The concentration of gentiopicrozida in high limits, the value of the variability coefficient is $s\% = 20,17$ (see table 2). This value outlines a big variability, thing that helps us to write a successful study about the selection under the aspect of growing the concentration of gentiopicrozida

The volatile oil has a variability coefficient of $s\% = 14,86$ (see table 2), from which we can draw the conclusion that the character can be influenced by the selection.

For sugars the variability coefficient $s\%$, is 14,11 (see table 2), being a middle value and in this case being possible of an efficient selection.

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