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Studies concerning the phenotipical variability of some *Gentiana lutea* l. genotipes

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Abstract. The ever increasing demands for raw materials obtained from *Gentiana lutea* L. species. will lead to introducing this species into culture. The cultivators will have the chance to obtain significant earnings by selling the production. For this. we identified 10 families that can be a prime source of germplasm for some amelioration. They were subjected to an analysis study of the variability of diverse quantitative elements. In the present article. we show the correlations carried out between different characters: the parcel diameter. the length of the rhizome. the number of ramifications. total mass of subterranean organs. height. number of knots. number of bastes. total number of fruits on the plant.

The superior quality of the raw material obtained trough the cultivation methods established as the research we developed and extending a superior cultivator into the culture. will decrease the temptation of harvesting our country's spontaneous flora. this species having a small habitat and a small density. that do not allow satisfying the industry's demand.

INTRODUCTION

In our country. the species *Gentiana lutea L.* is considered one of the "jewels" of the mountains (GRIGORESCU. 1987). being found in the Oriental Carpathians (Maramures Mountains. Rodnei Mountains. Hasmasul Mare massive) and in the Meridian Carpathians (Ciucas Massive and the calcareous massifs of Barsei Mountains: Piatra Mare (1849 m). Postăvarul (1802m) and Piatra Craiului (2239m) that have the richest areas of spontaneous growth of the *Gentiana lutea L.* species). The intense and irrational exploitation of the natural basins rich in spontaneous flora and especially those rich in gentiana. have endangered the mere existence of this species in the Romanian floristic carpet. the species being declared "endangered species" and included in a protection program. This is the reason why we focused our attention towards identifying the valuable genotypes at this species.

In order to introduce this species into culture. obtaining new genotypes is needed. superior to the existent ones. This process requires the realisation of new gene combinations. more adapted to the environment conditions and the agro-technical conditions in which the new generations will be cultivated. The number and value of these combinations has a direct dependency with the diversity and value of the available genes (POP. 2006).

The most utilised raw material -*Radix Gentianae* –is very sought after for its tonic. stomachic. digestive. antihelmintic. collagogue. emmenagogue. febrifuge. apperitive and sour properties. It stimulates the production of white sanguine cells. has antipyretic and antimalaric properties (PÂRVU. 2003).

In all the research performed until today on the *Gentiana lutea* L. species. the roots rhizome is mostly highlighted as the most important organ. from the viewpoint of its content of active principles. followed by the fruits. the stem. the leaves and the flowers (PĂUN et al.. 1988).

The efficiency in improving the characters with advanced heritability. on which you can identify precocity. chemical composition. etc. it is important to be followed in an amelioration process (SAVATTI et al.. 2004).

From the ameliorator point of view. you should follow the efficiency in improving the characters with pronounced heritability. on which you can identify precocity. chemical composition. etc (SAVATTI et al.. 2004)

MATERIAL AND METHODS

In Postăvarul Massive we marked and monitored 10 families with flowers that belonged to *Gentiana lutea* L. species. from a very heterogeneous population. with big variation amplitudes in what concerns the morphological characters analysis . which made possible the selection works performed on this genotype.

There were measured. determined or observed and quantified quantitative characters aerial and subterraneous.

In this research we calculated simple correlations between some morphological characters of the subterraneous and aerial characters.

In using this method. the calculation formula of the simple correlation coefficient is the following:

$$\pm r = \frac{\sum (x-\bar{x})\times(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \times \sum (y-\bar{y})^2}}$$

Determining this elements was done based on methodological indications found in literature (ARDELEAN and SESTRAŞ. 1996). The signification of the correlation coefficient was established considering the limit indicated as significant for p=5% and p=1% and the freedom degrees of the analyzed cases.

RESULTS AND DISCUSSIONS

Every morphological character of the subterranean and aerial organs. for each of the 10 families of *Gentiana lutea* L. selected. was analyzed during the research. from the evolution point of view as well as from the behavior in the vegetation period. In table 1 we synthesized the results of the observations concerning the morphological characteristics of the organs subjected to the measuring. the data representing the centralized results at the end of August and the beginning of September 2007.

By calculating the correlation coefficient "r"(see table 2) we obtained a series of important data for the amelioration process of this species.

From table 2 we can see the positive correlations – significant and distinctively significant between the morphological characteristics of aerial organs (except MMB). For example. we highlight the number of knots that correlate significantly with the height of the stem (r = 0.644). her number of cymes (r = 0.636). as well as the total number of fruits (r = 0.55). Be carefull at the fact that MMB is negatively correlated with all this characters; with a total height (r = -0.465) and a total number of fruits (r = -0.319) and in what concerns MMS the correlation is distinctively significant – negative (r = -0.84).

Table 1

Results concerning the morphological characteristics of the plant and seeds on the *Gentiana lutea* L. families selected at Brasov - 2007

No.	Family	Root				Steam			
		Ø parcel (cm)	Length (cm)	Number of ramifications	Total mass (g)	Height (cm)	Number of knots	No of cymes	No of fruits/pl
1.	G_1	6.2	91	4	1210	106	8	5	117

2.	G_2	7.0	98	3	1410	100	8	4	91
3.	G_3	7.1	93	4	1320	112	11	5	112
4.	G_4	7.9	72	4	680	102	8	4	54
5.	G_5	2.8	51	2	260	103	9	5	70
6.	G_6	3.1	64	3	410	91	8	4	62
7.	G_7	3.0	54	4	320	86	8	4	88
8.	G_8	5.8	70	4	420	76	6	4	53
9.	G_9	6.3	84	4	930	99	8	4	67
10.	G_{10}	5.2	81	4	890	88	8	4	52

The medium mass of seed or MMS is significantly correlated – positive with the length of the root (r = 0.625). with the total mass of the root (r = 0.681) and with the total number of fruits.

Table 2

Corelations established between all the characters subjected to measuring at the *Gentiana lutea* L. families selected in Brasov - 2007

Character	Stem					Root			
	No Knots	**No Cymes**	**Total no of fruits/pl**	**MMS (g)**	**MMB (g)**	**Ø parcel (cm)**	**Length (cm)**	**No ramifications**	**Total mass (g)**
Total height	0.644*	0.838	0.727**	0.516	-0.465	0.328	0.458	-0.1024	0.574*
No knots		0.636*	0.55*	0.136	-0.131	0.079	0.213	-0.155	0.380
No cymes			0.659**	0.125	0.025	-0.027	0.107	-0.263	0.233
Total no fruits/pl				0.547*	-0.319	0.171	0.465	0.088	0.597*
MMS (g)					-0.84**	0.523	0.625*	-0.025	0.681*
MMB (g)						-0.519	-0.73**	-0.073	-0.731**
Ø parcel (cm)							0.789**	0.518	0.735**
Length (cm)								0.382	0.972**
No ramifications									0.296

* Significantly positive; ** positive. distinctively significant; ^{0} significantly negative

^{00} negative. distinctively significant

An especially important character is the length of the root. character which correlates positively significant with MMS (r = 0.625) and distinctively significant with the diameter of the parcel (r = 0.789). and with MMB it's a negative correlation distinctively significant (r = -0.73).

In what concerns the total mass of the root. it correlates positively significant with the total height (r = 0.574) and with MMS (r = 0.597). and with MMB there's a negative correlation distinctively significant (r = -0.731). Also. this character has more positive distinctively significant correlations with the root length (r = 0.735) and the number of ramifications (r = 0.972).

CONCLUSIONS

One motif for which the analysis of morphological characters is imposed. is that starting from the phenotypic expression of some aerial characters and helped by the correlations already known. we can have information about certain subterranean characters.

information that will be confirmed or infirmed after the deplantation operation. Also. expressing some morphological characteristics on the stem level (no of knots. number of cymes. total number of fruits. etc.) can give information about the manifestation of certain physiological characteristics as shake resistance. falling resistance. etc. An especially important fact is knowing the morpho-chemical characteristics of some species in different vegetation phases. considering that often the phonotypical expression is influenced by them.

The negative correlaton MMB with a series of characters must be considered in the amelioration process for the seed characters. because we need a well developed seed material. with a great germination power. considering the fact that the present species presents a series of problems not yet completely understood. at this moment.

The positive correlations of the total root mass with total height and with MMS. easily observable characters. make us happy because they represent a good chance for the selection work for improving this so important character.

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