RESEARCHES REGARDING THE FLOWERS COLOR TRANSMISSION TO DESCENDENTS AT *GLADIOLUS HYBRIDUS* L.

CERCETĂRI PRIVIND TRANSMITEREA ÎN DESCENDENȚĂ A CULORII FLORILOR LA *GLADIOLUS HYBRIDUS* L.

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Abstract. *Nowadays, gladioli are most often used as cut flowers for vases in various floral arrangements, bouquets, using only cultivars of the Gladiolus genus, or in combination with other flower species. In order to observe how the color of the gladioli was hereditary transmitted, were performed direct intraspecific crosses between 15 varieties having different colors, existing in the UASVM Cluj-Napoca collection, from which resulted 10 hybrid combinations. In 2012, was performed a comparative analysis of F_1 hybrids and their parental forms in terms of flower's color. At the first generation, F_1 hybrids showed phenotypic several intermediate colors between genitors or inherited from one parent the color, in all combinations that were performed. Flower's color has shown greater variability in F_1 hybrids than parental forms, with a tendency to exceed significantly with more or less the mean of this character.*
Key words: *hereditary, hybrid, genitor, phenotypic*

Rezumat. *În momentul de față, gladiolele sunt cel mai des utilizate ca şi flori tăiate în diferite aranjamente florale pentru vaze, buchete, fie folosind doar soiuri ale genului Gladiolus, fie în asociere cu alte specii floricole. În vederea observării modului de transmitere ereditară a culorii la gladiole s-au efectuat încrucişări intraspecifice directe între 15 soiuri de diferite culori, existente în colecția USAMV Cluj-Napoca, rezultând 10 combinații hibride. În anul 2012, s-a efectuat o analiză comparativă a hibrizilor F_1 şi a formelor parentale ale acestora din punct de vedere a culorii florilor. În prima generație F_1, hibrizii obținuți au manifestat fenotipic, la toate combinațiile efectuate, mai multe culori intermediare între genitorii utilizați, sau au moştenit culoarea de la unul din părinti. Culoarea florilor manifestă o variabilitate mai mare la hibrizii F_1 decât la formele parentale, cu tendința de a depăsi semnificativ în plus sau în minus valorile medii ale caracterului respectiv.*
Cuvinte cheie*: ereditar, hibrid, genitor, fenotipic*

INTRODUCTION

The modern *Gladiolus* cultivars offer a diversity of colors, shapes, and sizes available in few other flowering plants. It is cultivated in almost all countries of the world where spring and summer conditions are favorable (Cantor and Tolety, 2011). Today, *Gladiolus*, the queen of the bulbous ornamentals, is the leading

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geophytes grown worldwide for cut flower trade and garden displays. It occupies a pristine place in the garden for its magnificent inflorescence, wide array of colors, and fascinating varieties of shapes and sizes (Pragya, 2010).

Most of the economically important ornamental plants are cut flowers, which are produced by vegetative propagation. For many years, new varieties of ornamental plants have been produced by cross-hybridization and mutation breeding techniques, separately or in combination (Shibata, 2008).

Gladioli are popular plants, cultivated in Europe for more than 250 years and renewed for their striking, colorful flowers. In the last period, in many countries the production value of *Gladiolus* cut flower was increased. Nowadays, in Romania, few persons grow gladioli and the assortment is limited at some cultivars obtained from commerce (Cantor et al., 2010).

Hybridization, the crossing of one cultivar with another, will probably continue as the most reliable source of new cultivars (Hartline, 1996). Flower color is one of the fundamental characteristics in terms of decorative value of all flowering species and more. *Gladiolus* species meets a variety of colors, from white to red, burgundy, yellow or purple. The varieties with various stripped or different colors on lip petals or midribs are completing the range of colors (Cantor et al., 2006).

It is also important to study the performance of existing cultivars for their superior desirable characters (Swaroop, 2010).

MATERIAL AND METHODS

The investigation took place at UASVM Cluj-Napoca, using plant material from the didactical collection of *Gladiolus*. For the study, in 2010 were used 15 cultivars to perform direct intraspecific crosses from which in 2012 were selected 10 elites $F_{1.}$ The hybrids and their genitors were analyzed in terms of the color of the flowers.

Table 1

Colors of genitors and hybrid combinations

Genitors ♀ x ♂	Color of the flowers at genitors	
	maternal	paternal
White Prosperity x Cipriana	white with purple to pink	lemon green
Nova Lux x Fidelio	yellow	intense pink
Nova Lux x Madonna	yellow	blue
White Prosperity x Plum Tart	white with purple to pink	burgundy
Trader Horn x Mon Amour	coral red	light yellow
Princess Marg. Rose x Plum Tart	range with yellow	burgundy
Black Jack x Alice	burgundy to claret	orange
Peter Pears x Blue Isle	orange	indigo
Trader Horn x Wine and Rose	coral red	pink
Peter Pears x Expresso	orange	dark red, deep velvety

The cross hybridization protocol implementation and the steps taken to obtain the F_1 elites were described by Horț et al., 2012 in Bulletin UASVM. A detailed observation was made on the selected genitors and the F1 elites regarding the uniformity of the color, the presence or absence of other color (spots, strips, dots etc.). The data are presented in the table below (table 1) and the plants were photographed using a digital camera. The data were processed and statistically interpreted using Microsoft Excel 2007 version.

In table 2 are presented the number of seeds that were planted in the field from, which 100 plans were selected from each hybrid combination.

Table 2

***Gladiolus* hybrid combinations and the number of seeds obtained, 2010 Cluj-Napoca**

Hybrid comb.	Female Genitor ♀	Male Genitor ♂	No. of pollinated flowers	No. of ripen flowers	No. of seeds
H5	White Prosperity	Cipriana	11	9	201
H6	Nova Lux	Fidelio	21	17	583
H7	Nova Lux	Madonna	20	18	612
H9	White Prosperity	Plum Tart	38	29	908
H13	Trader Horn	Mon Amour	12	6	224
H16	Princess M. Rose	Plum Tart	36	10	543
H22	Black Jack	Alice	30	25	305
H25	Peter Pears	Blue Isle	30	9	387
H34	Trader Horn	Wine and Rose	30	21	347
H35	Peter Pears	Expresso	30	28	446
Total			258	172	4556

RESULTS AND DISCUSSIONS

In table 3 is presented the distribution of the color of the flower to descendents obtained from ten hybrid combinations.

Analyzing table 3 can conclude that 17.2 % from descendents inherit the color from the maternal genitor, 17.5% from the paternal genitor and 40.9% have intermediary colors. From the total of 1000 analyzed plants, only 24.4% of descendents have other colors. From the ten hybrid combination studied, only at H6 combination the highest number of descendents resemble to the maternal genitor (75 plants) and in the case of H16 combination, 78% of descendents resembled to the paternal genitor.

Comparing figure 1.a. with figure 1.b. it can be observed that in a combination of a yellow flower with a white one, the yellow color is dominant and was transmitted downward maternal and paternal.

If the yellow flower is combined with a blue one (fig. 1.c.) or red one (fig. 1.f.), then the yellow color became recessive and the number of hybrids obtained with this color is smaller than those that had other colors.

In the case of H9 (fig. 1.d.) and H13 (fig. 1.e.) combination the white color is dominating the burgundy or coral red color.

Table 3

Hybrid plants repartition by color

Hybrid comb.	Color of the flower at genitors		Hybrid plants repartition			
	maternal	paternal	Resembling to maternal genitor	Resembling to paternal genitor	Interme-diary color	Other colors
H 5	white with purple	yellow lemon to green	1	27	59	13
H6	yellow	intense pink	75	4	16	5
H7	yellow	blue	-	18	5	77
H9	white with purple	burgundy	21	5	72	2
H13	coral red	light yellow	3	6	21	70
H16	yellow	burgundy	4	78	4	14
H22	burgundy to claret	orange	8	15	74	3
H25	orange	indigo	23	-	35	42
H34	coral red	pink	20	9	66	5
H35	orange	dark red with velvety	17	13	57	13
Total			172	175	409	244
Average			17.2	17.5	40.9	24.4

In the combination of orange color with burgundy (fig. 1.g.) or indigo (fig. 1.h.), the dominating color is orange knowing that the number of hybrids having this color is almost double comparing with those who inherit the color of the paternal genitor. 23% of H25 combination inherited the orange color from the maternal genitor, while the indigo color of the paternal genitor was not transmitted to descendents.

The figure 1.j shows that the difference between the number of descendents that inherit the maternal genitor's color and those who inherit the paternal genitor's has a value of 4%, the majority of plants obtained from cross hybridization had intermediary colors (57%).

In the case of a combination between two colors of the range: coral red with pink (fig. 1.i.), the greatest percent was registered by the intermediary colors (66%), but the red color was transmitted also to a considerable number of descendents (20%).

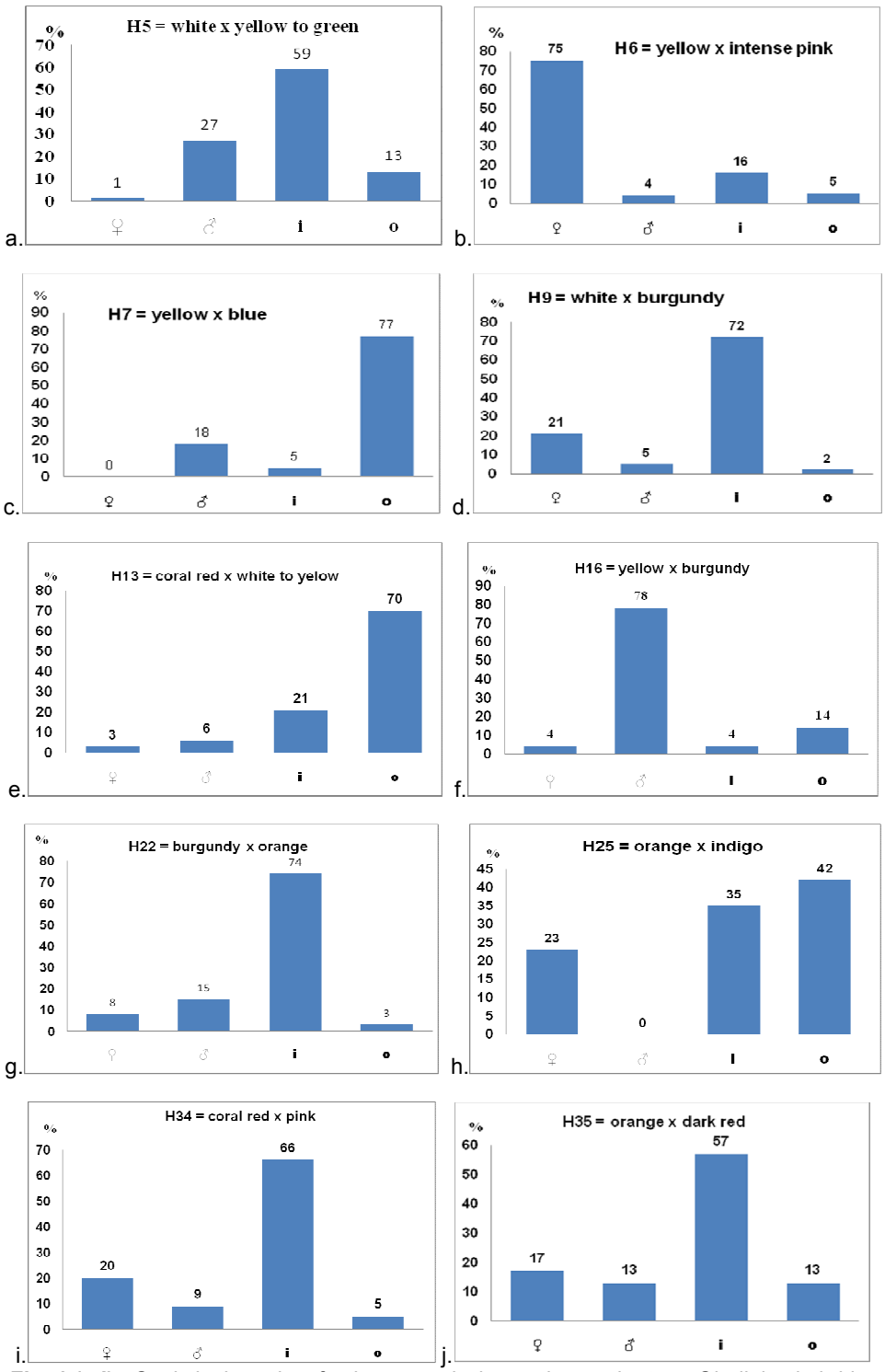

Fig. 1 (a-j) - Statistical results of color transmission to descendents at *Gladiolus hybridus*

CONCLUSIONS

1. The transmission of the color from the maternal and the paternal genitor to descendents was achieved in approximately 17% of the cases.

2. In the case of the ten analyzed combination, there is a chance of almost 25% to obtain other colors than the parents in the hybridization process.

3. The higher percentage of hybrids with intermediary and other colors than the genitor's, is assuring the material for selecting valuable clones, and so, 65.3% of descendents, elites can be selected.

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