

## Brazilian descriptor for *Hippeastrum* hybrids

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### Abstract

In 1997, the Brazilian Government approved the Plant Cultivar Protection Law and also created the National Register of Cultivars (RNC), which obliges the registration of cultivated plants for economic exploitation at the Ministry of Agriculture. The result was the UPOV descriptors need to be translated into Portuguese and its adaptation to RNC rules. As *Hippeastrum* is an indigenous genus in this country, and crossings with native species may give rise to new cultivars and forms, it was decided, in some cases, to take as model plants the native species, which have characteristics that may be introduced in the new hybrids. Until now, in the UPOV descriptors normally cultivars are mentioned as models. As these cultivars are not always precisely known around the world and may also be obsolete, and even lost with time. This situation doesn't happen with the botanical species, whose characteristics are easily accessed in herbaria worldwide.

### Objective

Adaptation of amaryllis (*Hippeastrum* Herb.) descriptor from UPOV – The International Union for the Protection of New Varieties of Plants into the Portuguese language for the use of SNPC –National System for Cultivars' Protection, from the Ministry of Agriculture, Brazil.

### Introduction

#### Floriculture and breeding

Floriculture business in Brazil has been growing every year basically to supply the internal market, but also to improve the export of flower products. Brazil is known by its rich and huge tropical flora. The exploitation of this natural resource has been always denied by the Brazilian population, possibly because of the European colonization, which imposed its culture in the new continent ignoring the local native culture. Nowadays, as a consequence of the Rio 92 meeting, and the discussions about the Convention of Biodiversity (CBD) - Brazil's eyes have been opened to the natural resources of the country's flora, which are no longer considered as weeds to be dug up and burnt, but a germplasm to be conserved for environmental conservation and for human benefit (Tombolato, 2006).

Breeding for new ornamental products is a challenge and lot of planning is needed. The initial requirements for the breeding program are;

- a germplasm bank;
- study and the development of basic research;
- correct identification of species or product;
- screening of limitations;
- development of production techniques;

- knowledge of the demands and trends of the market;
- marketing considerations and final trading of the product;
- financial investment for a long period of time.

To attain these goals, a multidisciplinary team is needed including: botanists, breeders, physiologists, phytopathologists, experts on production techniques, growers, nurserymen, agents for technology transfer, trade and marketing agents, among others.

Investment in breeding in Brazil depends on a strong law for cultivar protection, which permits the investors to obtain profits from their businesses. In 1997, the Brazilian government approved the Plant Cultivar Protection Law (law nr. 9.456) and also created the SNPC – National Service for Cultivars' Protection. This law is now under a review process to adapt it to modern agriculture, especially on the items pertaining to the vegetatively propagated plants. It is wise to remember that the cultivar protection law also directly stimulates the valuation of the native flora and indirectly its preservation.

### **Genus *Hippeastrum***

The Amaryllidaceae family presents plants of high ornamental value and great commercial appeal and, for these reasons there has been a lot of interest in the conservation of its natural diversity. The amaryllis bulb is an important product for the international flower market, while the floral stalk is the product of lesser economic expression (Tombolato, 2004). The IAC has developed, since 1982, a program of improvement of *Hippeastrum* based on the use of the genetic variability of the Brazilian native species, aimed at the creation of new products. This *Hippeastrum* Breeding Project carried on at the Instituto Agrônômico - IAC systematically collects bulbs of native species in diverse regions of the country, and uses them in controlled pollinations with botanical species, hybrids and tetraploid commercial varieties, such as 'Red Lion' and 'Apple Blossom'. (Tombolato & Castro, 1989).

The genus *Hippeastrum* (Amaryllidaceae) has about 55 to 75 species, with many endemic in Brazil (Dutilh, 1996). The species gamma that composes the genus, and its morphological variation has made possible the creation of hundreds of varieties during the last two centuries. The cultivated varieties are normally tetraploid, the result of crossings that involved diverse botanical species, carried out initially by Johnson, in 1799 in England, through the crossing of *H. reginae* and *H. vittatum* (Ockenga, 2002), both Brazilian native species.

In 1863, M. Krelage and Son., a Dutch consolidated nursery, produced a catalogue with about 350 listed hybrids (Anonymous, 1981). Currently about 300 cultivars are in commercial use, however the presentation of a complete list is difficult. The main available commercial varieties are 'Apple Blossom', 'Ster van Holland', 'Orange Sovereign', 'Overingen', 'Ov. Gesir', 'Ov. Oranje', 'Ov. Rood', 'Ov. Zalm', 'Red Lyon', 'Telstar', 'Rilona', 'Piquant', 'Ferrari' and 'Picotée'.

### **SNPC Premises**

The SNPC, in its functions of registration and protection of the plant varieties in the country, felt for the last years the need to establish criteria for registration and protection in agreement with the Law of Protection of Cultivars. The Brazilian system is based on the model of The International Union for the Protection of New Varieties of Plants (UPOV), with headquarters in Switzerland and takes for a base the already existing descriptors in that organisation. The form instructions are aimed at establishing lines of direction for the evaluation of distinctness, uniformity and stability (DUS) making uniform the technical procedure of evidence that the cultivar presented is distinct of other(s) whose descriptors are known, that its characteristics are homogeneous in each reproductive cycle and repeated in successive generations.

The SNPC also obliges the registration of every cultivated plant for economic exploitation, through the system called National Register of Cultivars - RNC.

To facilitate the determination of distinctness it is recommended to group the cultivars. Characteristics that permit the cultivars' grouping are those which are stable, or very slightly variable among the group of cultivars. Their diverse levels of expression must be equally well distributed in the group.

The use of the following characteristics for grouping the cultivars is recommended:

- a) Flower: type (characteristic 7)
- b) Flower: maximum width of perianth (characteristic 13)
- c) Flower: main inner color (characteristic 24) with the following groups of colors:
  - Group 1: white
  - Group 2: yellow
  - Group 3: salmon
  - Group 4: light rose
  - Group 5: pink
  - Group 6: red
  - Group 7: dark red

To facilitate the evaluation of the diverse characteristics, a code scale with values was created, which normally vary from 1 to 9. The interpretation of this codification is the following:

- When the code's alternatives are sequential, that is, when there are no spaces between the different values and the scale starts at value 1, the identification of the characteristic must be done, necessarily, by one of the listed values. Example: 'Flower: form in frontal view' value 1 for 'round', value 2 for 'triangular', and value 3 for 'star-shape'. Only one of these three alternatives is accepted.
- When the code's alternatives are not sequential, that is, if there are one or more spaces between the values proposed, the description value of the characteristic may be different of the previewed ones, in intermediary or extreme variations. Example: '1. Leaf: width' codifies the value 3 for 'narrow', 5 for 'intermediate' and 7 for 'large'. In this case, for example, the value 4 can be chosen, indicating that the width of the leaf is classified between narrow and broad, Any value between 1 and 9 can be chosen, value 1 indicating an extreme narrowness and value 9 an extremely broadness.

## Material and methods

Keeping as base the UPOV amaryllis descriptor, first it was translated to Portuguese. After that, taking in account research experience with the native botanical species, mainly of Brazil, new morphological characters used by taxonomists have been inserted.

Next, considering that a standardization of description of morphological characteristics has been proposed by taxonomists, after centuries of describing and testing of terms that can be more universally applied and understood, new morphological characters, that take this standardization in account, have been proposed.

## Results

Table 1 shows the up-dated descriptor of amaryllis (*Hippeastrum* Herb.), published by SNPC.

Name proposed for the cultivar .....

Characteristic	Identification of characteristic	Code	Model cultivar	Cultivar code
1. Leaf: width	narrow medium broad	3 5 7	Pink Floyd (ONLY FLOWERS) Orange Love (NO PICTURE) Nellie (NO PICTURE)	<input type="checkbox"/>
2. Leaf: anthocyanic pigmentation	absent present	1 2	Pink Floyd Renée	<input type="checkbox"/>
3. Scape: length	short medium long	3 5 7	Orange Love Kokarde Geest Flame	<input type="checkbox"/>
4. Scape: maximum width at the third length	narrow medium broad	3 5 7	Pink Floyd Orange Love Orion	<input type="checkbox"/>
5. Scape: anthocyanic pigmentation at base	absent present	1 2	Pink Floyd Moneymaker	<input type="checkbox"/>
6. Inflorescence: number of flowers	small medium large	3 5 7	Lemon Lime Masai	<input type="checkbox"/>
7. Flower: type	simple double	1 2	Orion White Peacock	<input type="checkbox"/>
8. Only double cultivars: flower: form of petaloid stamens (+)	<i>regular</i> <i>irregular</i>	1 2		<input type="checkbox"/>
9. Flower: length of pedicel	short medium long	3 5 7	Orange Love Orion Pink Floyd	<input type="checkbox"/>
10. Flower: anthocyanic pigmentation on the pedicel	absent present	1 2	Mr. John, Pink Floyd Red Lion	<input type="checkbox"/>
11. Flower: form on frontal view	round triangle star-shape	1 2 3	Orion Loes van Velden Pink Floyd	<input type="checkbox"/>

12. Flower: maximum length of perianth	short medium long	3 5 7	Yellow Pioneer Orion Loes van Velden	<input type="checkbox"/>
13. Flower: maximum width of perianth	narrow medium broad	3 5 7	Pink Floyd Masai Maria Theresa	<input type="checkbox"/>
14. Flower: sepals and petals	Isomorphic Heteromorfic	1 2		
15. Flower: sepals and petals margins	Straight Undulated Very undulated	1 3 5		
16. Flower: sepals and petals overlapping	small medium large	3 5 7	Yellow Pioneer Loes van Velden Red Lion	<input type="checkbox"/>
17. Flower: Paraperigonium (corona)	Absent Fimbriate very fimbriate Ring shape Very conspicuous ring	1 3 5 7 9	<i>H. striatum</i> <i>H. morelianum</i> <i>H. puniceum, angustifolium e papilio</i> <i>H. psittacinum</i> <i>H. aulicum e H. calyptratum</i>	
18. Flower: basis of the throat	Anthocyanic pigmentation	Absent Weak Dark	1 3 5	
19: Flower: basis of the throat	Chlorophyll pigmentation	Absent Weak Dark	1 3 5	
20. Flower: form of upper sepal	lanceolate elliptic widely-elliptic narrow-oval oval large-oval narrow-obovate obovate large-obovate	1 2 3 4 5 6 7 8 9	Spotty Yellow Pioneer Masai Loes van Velden Orion Pink Floyd	<input type="checkbox"/>

21. Flower: form of inferior petal	lanceolate	1																	
	elliptic	2																	
	widely-elliptic	3																	
	narrow-oval	4																	
	oval	5																	
	large-oval	6																	
	narrow-obovate	7																	
	obovate	8																	
	large-obovate	9																	
22. Flower: angle of the inferior sepals with the transversal line	Less than 45° of transversal	3																	
	45° of transversal	5																	
	More than 45° of transversal	7																	
23. Flower: incisions on the petals	absent	1	Pink Floyd	<input type="checkbox"/>															
	present	2	Maria Theresa	<input type="checkbox"/>															
24. Flower: main color of inner face	RHS catalogue color (indicate the reference number)			<input type="text"/>															
25. Flower: Color distribution	uniform	1	Red Lion	<input type="checkbox"/>															
	veined	2	Ludwig's Dazzler																
	flamed	3	Masai																
	picotée	4	Picotée																
	spotted band	5	Spotty																
	star-shape band	6	Orion																
26. Tepal: wrinkling degree	weak	3	Masai	<input type="checkbox"/>															
	medium	5	Mont Blanc																
	strong	7																	
27. Stamens: color	RHS catalogue color (indicate the reference number)			<input type="text"/>															
28. Anthers: color (before the dehiscence)	gray	1		<input type="checkbox"/>															
	yellow	2																	
	red	3																	
	rose	4																	
	purple	5																	
29. Style*	<table border="1"> <tr> <td>1/2 of perig. - Very short</td> <td>1</td> <td><i>H. evansiae</i></td> </tr> <tr> <td>2/3 of perigone - Short</td> <td>3</td> <td><i>H. blossfeldiae</i></td> </tr> <tr> <td>1/1 of perigone - Iguais</td> <td>5</td> <td><i>H. morelianum</i></td> </tr> <tr> <td>4/3 of perigone - Long</td> <td>7</td> <td><i>H. stylosum</i></td> </tr> <tr> <td>3/2 of perig. - Very long</td> <td>9</td> <td><i>H. angustifolium</i></td> </tr> </table>	1/2 of perig. - Very short	1	<i>H. evansiae</i>	2/3 of perigone - Short	3	<i>H. blossfeldiae</i>	1/1 of perigone - Iguais	5	<i>H. morelianum</i>	4/3 of perigone - Long	7	<i>H. stylosum</i>	3/2 of perig. - Very long	9	<i>H. angustifolium</i>			
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30. Pistil: color	RHS catalogue color (indicate the reference number)			<input type="text"/>															

31. Stigma: size	short	3		_
	medium	5		
	large	7		
32. Stigma	Trifid long	1	<i>H. aulicum</i>	
	Trifid short	3	<i>H. glaucescens</i>	
	Lobed	5	<i>H. puniceum</i>	

Table 1 - Descriptors of amaryllis (*hippeastrum herb.*) (\* Characteristic of style: Very short: 1/2 of perigone; Short: 2/3 of perigone; Equal: 1/1 of perigone; Long: 4/3 of perigone; Very long: 3/2 of perigone.)

Twenty three characters belonging to the original UPOV descriptor were translated to Portuguese and 9 new characters were inserted, as follows:

1. Flower: petals and sepals isomorfic or heteromorfic
2. Flower: margin of tepals smooth, ondulate or very ondulate
3. Flower: chlorophyll pigmentation at margin of corolla throath absent, weak, or strong
4. Flower: Form of upper sepal lanceolate, elliptic, widely-elliptic, narrow-oval, oval, large-oval, narrow-obovate, obovate, large-obovate.
5. Flower: Form of inferior petal lanceolate, elliptic, widely-elliptic, narrow-oval, oval, large-oval, narrow-obovate, obovate, large-obovate
6. Flower: inferior sepals at more than a 45° angle with a vertical middle line of flower, less than 45°, same of the transversal line

Characters transferred from the native species:

1. Flower: Paraperigonium (corona) absent, fimbriate, very fimbriate, ring-shaped, very conspicuous ring
2. Stigma: long trifid, short trifid, lobed
3. Style:
  - Very short: 1/2 of perigone;
  - Short: 2/3 of perigone;
  - Equal: 1/1 of perigone;
  - Long: 4/3 of perigone;
  - Very long: 3/2 of perigone.

After this adaptation based on existing characters in the botanical species, the descriptor of amaryllis is more inclusive and can be applied to the more diverse varieties that are nowadays obtained also through crosses with such species that amplify the morphological variability of the commercial products. The use of botanical species as reference also builds a better visualization of the characteristics, once the botanical species are more spread out and know worldly. The access to the knowledge of the morphological characteristics of these species is much easier in compared with the old cultivars, which in certain cases became obsolete and are not found in cultivation anymore.

## Conclusions

The adaptation of the UPOV descriptor of amaryllis (*Hippeastrum* Herb.) for the use by the SNPC made it more inclusive and of easy to use and also, to a certain extent, values the use and knowledge about the native species.

The use of botanical species as reference also builds a better visualization of the characteristics, once the botanical species are more distributed and known worldwide. The access to the knowledge of the morphological characteristics of these species is much easier in relation to the old cultivars, which in certain cases became obsolete and are not found in cultivation anymore.

This descriptor was published in December 16<sup>th</sup>, 2003, and is in use by the SNPC.

In 14/december/2005, the IAC registered three *Hippeastrum* cultivars: 'IAC Neblina' (IAC 207), RNC 20286 (figure 1); 'IAC Itatiaia' (IAC 208), RNC 20288 (figure 2), and 'IAC Jaraguá' (IAC 224), RNC 20287 (figure 3).

## References

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*Figure 1 - Hippeastrum new cultivar 'IAC Neblina' (IAC 207).*



*Figure 2 - Hippeastrum new cultivar 'IAC Itatiaia' (IAC 208).*



*Figure 3 - Hippeastrum new cultivar 'IAC Jaraguá' (IAC 224).*