

New Varieties of *Anthurium andraeanum* from Brazil

Antonio Fernando Caetano Tombolato, Luis Alberto Saes, Luiz Antonio Ferraz Matthes, Mauro Sakai, Gláucia Dias Tagliacozzo, Carlos Eduardo Ferreira de Castro, Renato Ferraz de Arruda Veiga and Wilson Barbosa
Instituto Agronômico, Caixa Postal 28, 13001-970 Campinas SP
Brazil

Abstract

In the Ribeira River Valley in the State of São Paulo, the main region for anthurium production in Brazil, until now seed-propagated plants grown from crosses made by the growers themselves predominated production. The characteristics of these plants and their flowers are heterogeneous. In recent years, the Instituto Agronômico in Campinas (IAC) released 12 varieties mostly for cut flower production. Only 11 named varieties are listed under the list of existing selections. They are multiplied in vitro by private laboratories and then transferred to the growers.

The breeding program on anthurium at the Instituto Agronômico aims to select vigorous and productive plants, with good quality flowers, mainly for cut flower production for the Brazilian market and possibly for future export. Hybrids are selected from among thousands of seedlings obtained from cross-pollination of selected plants from the collection of the Instituto Agronômico, at the Ribeira River Valley Experimental Station. Hybrids were cultivated in beds of organic soil under 70% shade net in an spray irrigated house, where they have been observed monthly for many years under low levels of pesticide use. After more than 20 years of selection, selection criteria have been established for IAC varieties, which have resulted in selections that perform well under a broad amplitude of temperature conditions (from 3 to 38°C). Selections with these characteristics are very welcome in times of controlled, organic production and high energy costs for controlled-climate greenhouses.

In this report, we also present brief descriptions of 12 new *Anthurium* selections, which are named for Brazilian Indian tribes.

INTRODUCTION

Anthurium belongs to the Araceae family. The genus includes around 1000 species (Croat, 2005), most of them tropical herbs originating from warm areas of Central and South America. Less than the tenth of these species are cultivated, although numerous hybrids and varieties exist due to the ease of interspecific hybridization. In Brazil, it is noted the occurrence of around 130 native species (Gonçalves, 2003). From a commercial perspective, the main species of this genus is *Anthurium andraeanum* Linden, which is cultivated as cut flowers (Pizano, printing).

We estimate that there are about 1.7 million *Anthurium andraeanum* plants in the main production area in the Ribeira River Valley of São Paulo State, Brazil (Associação dos Produtores de Flores, Mudanças e Plantas do Vale do Ribeira. Personal communication, 2004.). In that region, anthurium has been typically seed propagated resulting in extremely heterogeneous populations. But vegetative propagation methods are assuming great importance in this crop's development, as the methods lead to improved productivity and more uniform products.

In Brazil, the traditional vegetative propagation methods of stem section and shoot separation are slow, but they result in increased uniformity of marketed products. In this manner, diverse colors, sizes and forms have been preserved. There is great interest in producing uniform plants with good floral quality and productivity, but the mass production of these plants is only possible by in vitro techniques.

São Paulo State is the center of the most dynamic region for growing and marketing flowers in Brazil. Data on anthurium trading at the Ceagesp (São Paulo

wholesale market) indicated that 240,000 dozen flowers were traded in 1999, with more or less stable monthly trade of about 20,000 dozen. This quantity is three times the registered value of 7 years before, in 1992. During the period from 1997 till 1999, the mean price of a dozen flowers at the Ceagesp, was stable at about R\$ 7,00 to 8,00. The only significant price elevation was observed in the last two months of 1999, when the price rose to R\$ 9,94/ dozen in November and R\$ 11,91 in December.

In the Ceasa (Campinas Wholesale Market), sales have increased each year. In 1998, peak sales were noted in the months of December and March till July, with the maximum recorded at 3,404 dozen in December 1999. (Tombolato et al., 2002).

VARIETIES

In the anthurium crops cultivated in the Ribeira River Valley in the State of São Paulo, the only *Anthurium andraeanum* cultivars are the ones released by the Instituto Agronômico, although seed-propagated plants still dominate the growing areas. The growers themselves make the crosses, so it is common to observe many populations that are totally heterogeneous for the height, form and color of their spathes; the flowers show no uniformity. Such products have very limited penetration in modern markets, especially outside of Brazil.

Growers of the Holambra region (São Paulo State) introduced cultivars from Holland, which have displayed excellent floral quality and are popular with consumers. However, these growers have established private agreements with the foreign breeding enterprises and, thus these cultivars can only be exploited by a restricted circle of Brazilian growers.

HISTORY AND UP-TO-DATE SITUATION

In the 1950s and 60s, the former head of the Section of the Floriculture and Ornamental Plants of the Instituto Agronômico in Campinas, Dr. Hermes Moreira de Souza, started a collection of many types and varieties of *Anthurium*. This collection was maintained in a shade house in the Fazenda Sta. Elisa (now Centro Experimental Central), in an area named "Monjolinho". During the 1970s, Dr. Luiz Antonio Ferraz Matthes, a new researcher in the Section, did the first controlled crosses. At that time, the techniques of the micropropagation were only applied for scientific research, their commercial use in horticulture was just beginning. At that time, given the slow rates of increase produced by traditional vegetative propagation, the creation of pure lines propagated by seeds was considered. But self-pollination resulted in a great loss of vigor, which led to the abandonment of this approach. (Matthes. Personal communication, 2004.)

In the 1980s, anthurium breeding received new attention once the initial experiments in micropropagation began to produce results that could be applied to commercial production of selected clones. After this, the breeding program was revived, and the crop treated as one that is typically propagated vegetatively. Many visits were then made to anthurium growers in order to sample the huge genetic variability existing in the traditional crops of the Ribeira River Valley, with the goal of collecting plants with superior characteristics. These plants once added to the IAC's existing collection, could then be employed in controlled crosses and also could be directly multiplied in vitro for their evaluation and possible clonal release.

In 1997, the IAC released its first variety of *Anthurium andraeanum*, 'IAC Astral'. Other selected clones are also being multiplied in vitro and are being evaluated in collaboration with growers (Table 1) (Tombolato et al., 1997).

STEPS IN ANTHURIUM BREEDING AT THE IAC

Basically, the steps for developing the anthurium breeding program are:

Collection of Plants

An ongoing process, begun in the 1950s. Most of the plants have been collected from the growers' farms.

Controlled Crosses

The most recent controlled crosses were made in 1996. One needs to realize that it takes at least 2-3 years for a seedling to grow sufficiently to produce good flowers for evaluation.

Selection of Plants

Hybrid seedlings from controlled crosses made among the plants of the IAC collection or collected from growers (principally of the Ribeira River Valley) are evaluated monthly.

Multiplication of the Selected Plants

Stem division initially propagates selected plants for replicated evaluation. Hybrids produced from crosses made in 1996 are now at this stage.

Micropropagation of the Best Plants

Protocols are developed in the in vitro laboratory for the efficient propagation of selected plants. This technology is then transferred to private laboratories.

Evaluation

Evaluations rate selected seedlings for their productivity, resistance or tolerance to diseases, and post-harvest life.

Due to the long period necessary for the development of the plants of the anthurium till the adult age (3-4 years from tissue culture), the most selections are under productivity experiments.

Regional Observations

Regional observations are important and are made in the growers' nurseries. Growers agree to furnish information about plant performance upon request, and they permit free access by IAC researchers to their crops.

CHARACTERISTICS FOR CUT-FLOWER SELECTION

The following is a list of important characteristics of the hybrid seedlings, which are observed during the monthly evaluations.

Spathe

Medium size (10-15 cm long), brilliant color, flat, opened, hard texture, prominent nerves, well developed lobes on heart shape, uniform coloration (except for bicolor), minimum 15 days of keeping quality after harvest.

Spadix

2/3-3/4 as long as the spathe length, contrasting color to the spathe, except for the white, held at an acute angle to the spathe

Flowering Stem

Erect, hard, minimum 60 cm long

Plant

Short internodes, compact growing habit, non sprouting, tolerant or resistant to the main diseases: anthracnose (*Colletotrichum gloeosporioides*), bacteriosis (*Xanthomonas axonopodis* pv. *dieffenbachiae*) and viral pathogens.

SELECTIONS AND VARIETIES IAC OF THE ANTHURIUMS

Since 1997, with the release of the first variety 'IAC Astral', 24 selections have been offered to the growers. Of these, 11 of the most important are listed below.

'IAC Astral' (IAC 154)

Spathe of strong and luminous coral color, spadix white/yellow: plant productive and tolerant to bacteriosis, recommended also as pot plant; cut flower with long post-harvest durability, over 20 days.

'IAC Cananéia' (IAC 16772)

Large spathe even in young plants, white color (greenish on the borders of very vigorous plants); spadix rose; plant vigorous with rapid growth, productive; cut flower with long post-harvest durability.

'IAC Eidibel' (IAC O-11)

Plant vigorous of medium size, very productive; medium-sized, heart-shaped spathe with a strong red color, thick texture and good enervation; spadix white, slightly scented; cut flower with long post-harvest durability.

'IAC Ômega' (IAC 14021)

Large spathe of coral color; spadix white/yellow; plant productive; cut flower with long post-harvest durability.

'Iguape' (IAC 17236)

Spathe of medium size, good texture, and a brilliant dark red color; spadix cream color with rose orangish shades; plant productive; cut flower with medium post-harvest durability, around 20 days.

'Isla' (IAC 14018)

Spathe roundish, of white color with greenish borders; spadix white/yellow; tall plant.

'Júpiter' (IAC 17237)

Spathe white; spadix pinkish; tall plant.

'Juquiá' (IAC 17260)

Spathe coral; spadix white/yellow; small plant with strong sprouting and productive; recommended as a pot plant.

'Juréia' (IAC The-5)

Spathe with many nerves and a luminous, brilliant coral color; spadix white/yellow; plant productive with medium vigor; cut flower with long post-harvest durability, around 30 days.

'Luau' (IAC N-15)

Spathe of medium size, good texture, and a brilliant white color; spadix almost totally white; plant productive; cut flower with long post-harvest durability.

'Netuno' (IAC 16770)

Plant of medium vigor, good productivity; heart-shaped spathe of medium size, with good enervation and a very dark wine brown color ("black"), contrasting to the white spadix with a yellow-greenish tip.

'Rubi' (IAC 14019)

Large spathe of red color; spadix white/yellow; tall plant; cut flower with long post-harvest durability.

Since their commercial introduction, micropropagated plantlets have been distributed to growers by an agreement between the IAC and private laboratories.

Productivity of the first 12 selections of micropropagated anthurium was evaluated

under cultivation in the Ribeira River Valley at the former Experimental Station of the Instituto Agrônômico (Table 2), and in private nurseries. Production data from the nursery of Mr. Maurício Grossi, at Guaratuba, State of Paraná, are shown in Table 2.

These data demonstrate a general level of productivity for all the selections, considering the average of 5 to 6 flower/plant/year as satisfactory. Under cultivation at Pariquera-Açu, the productivity of 'IAC Eidibel' with an average of 6.41 flowers per plant in a period of only 11 months, when the plants were between the second and third years of cultivation in beds, was particularly noteworthy. 'IAC Cananéia' is also a productive and vigorous plant with the average of 5.44 flowers/plant. Average productivity levels for the selections 'Luau', 'Rubi' and 'Juréia' cannot be considered as definitive, due to small sample sizes.

Notice: on 19 July 2000 production was interrupted due to intense cold, with a minimum night temperature inside the shade house of 0°C. Harvests resumed only after 18 October.

With regard to the flowers' post-harvest durability in vases with water, it can be observed (Table 4), that the variety 'IAC Astral' is the most durable, with a vase-life of 34 days, and 'Iguape' is the least, with only a 20-day vase-life, although all these values are within tolerable limits.

THE NEW SERIES OF ANTHURIUM HYBRIDS

Twelve new anthurium varieties are presented now; they are named for Brazilian Indian tribes: (Tombolato et al., 1998)

'Aikanã' (IAC NL 79) – green spathe and spadix

'Apalai' (IAC NK 130) – light red spathe and white spadix

'Aruak' (IAC NK 142-143-144) – white spathe with rose nerves and white spadix

'Ianomami' (IAC NM 84-85-86-87) – deep orange bicolor spathe with green edges and white spadix

'Kauê' (IAC NK 151-152) – brown spathe and green spadix

'Krenak' (IAC NL 89-90) – white (slightly pink) bicolor spathe with green edges and white spadix

'Kinã' (IAC NM 70) – green spathe with brown shades on the nerves and green spadix

'Krahô' (IAC NK 10) – large red spathe and white spadix

'Parakanã' (IAC NK 50-51) – white (slightly pink) spathe and white spadix

'Terena' (IAC NN 155-156) – pink bicolor spathe with green edges and white spadix

'Xavante' (IAC NK 129-131) – salmon bicolor spathe with green edges and white pinkish spadix

'Zoé' (IAC NM 157-158-159) – pink spathe and spadix

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Tables

Table 1. Anthurium clones selected by IAC used for micropropagation and their main characteristics.

CLONES	CHARACTERISTICS
IAC N-15 ‘Luau’	White
IAC The-5 'Juréia'	Coral
IAC The-11	Red, very productive
IAC 46	Red
IAC 75	White
IAC 154 ‘IAC Astral’	Salmon, resistant to bacteriosis
IAC 179	Rose
IAC 14018 ‘Isla’	White
IAC 14019 ‘Rubi’	Red
IAC 14020	Coral
IAC 14021 ‘IAC Ômega’	Coral, large
IAC 16770 ‘Netuno’	Wine (black), small
IAC 16771	White
IAC 16772 ‘IAC Cananéia’	White
IAC 17237	White
IAC 17236	Wine
IAC 17260 'Juquiá'	Coral (vase type)

Table 2. Productivity of IAC selections of anthurium as evaluated at the Polo Regional de Agronomia of the Ribeira River Valley (Pariquera-Açú, São Paulo State)

Variety/Selection IAC	Number of plants	Period: oct/98 the aug/99	
		Total number of the harvested flowers	Average number of flowers/plant
IAC Cananéia	29	158	5,44
IAC Eidibel	99	635	6,41
Juréia	13	77	5,92
Luau	4	24	6,00
IAC Ômega	160	802	5,01
Rubi	4	19	4,75

Table 4. Post-harvest durability of flowers of IAC anthurium cultivars, tested at Polo de Agronomia in the Ribeira River Valley (Pariquera-Açú, São Paulo State)

Cultivar	durability of the flowers in water (days)
IAC Astral	34
IAC Cananéia	24
IAC Eidibel	29
Iguape	20
Juréia	30
Luau	26
IAC Ômega	30
Rubi	30

Table 3. Production (in dozens) of IAC selections of anthurium as evaluated in the nursery of Mr. Mauricio Luiz Grossi, at Guaratuba, Paraná State.

Varieties	1999		2000										TOTAL
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	
IAC Cananéia 2838 plants	26	35	40.5	35.5	48.5	48.5	63	35.5	24			22.5	356.5
IAC Eidibel 3027 plants	63.5	110.5	116	117.5	130	96.5	129	86	48.5			77	887.5
Iguape 226 plants							7	3	1.5				11.5
Isla 69 plants													
IAC Ômega 303 plants	6	4	3.5	1.5	6	7.5	9.5	3	4				45
Juréia 1125 plants	18	28	35	24	47.5	26	33.5	23.5	21.5			22.5	279.5
Luau 925 plants	6	3.5	5	11	14	16.5	13.5	10	7.5			1	88
Netuno 640 plants	5	8	16	10.5	14	16	19	14	7				109.5
Rubi 72 plants	1.5	2.5	3.5	2	1	1.5	2		1			1	16