

Recent studies on the correlation between new *Anthurium andreanum* pot plants cultivars

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Abstract Flamingo lily (*Anthurium sp.*), named by the shape and color similarity with birds, is an epiphytic perennial tropical plant. *Anthurium* gained an important place in the Romanian flower collections, due to the large number of hybrids, well adapted to indoor area conditions. In recent years, enrichment assortment with new varieties and hybrids of ornamental plants is a constant activity of specialists in our country, in order to obtain high income, not only for cut flowers used in floral art. This paper presents the behavior of four new varieties of red flower *Anthurium andreanum*, which are suitable for culture and grow in pots, imported from the Netherlands and studied in 2009-2011 at the teaching greenhouses of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. In general, some plants have the ability to change air quality, being effective in reducing carbon dioxide. The evapotranspiration process helps to remove pollutants from the atmosphere, increasing the real humidity of the space. Some indoor plants, for example *Anthurium* have the main characteristic, as a sanogenic plant, to improve indoor air quality. Moreover, due to the unique appearance, Flamingo flower can be successfully used in interior design, reaching a spectacular effect.

Key words

Anthurium varieties, flower, indoor plant, leaf, morphological characteristics

In last decades, with the existence of a wide range of ornamental plants and the knowledge of cultural technologies, indoor plants become the most widespread passions. The decorative plants, for more than 5000 years, had found place in the most luxurious interiors (palaces, temples, houses of aristocrats, etc.). Even if, in the past, only rich people could afford to have ornamental indoor plants, today it is accessible to anyone [6].

Anthurium andreanum, also called the Flamingo lily, due to the similarity of shape and color with the flamingo bird, is an epiphyte tropical ornamental flowering plant, a perennial growing as a bush form. *Anthurium* grows well in rooms with eastern or southern windows, while low light has the effect of reducing the number of flowers or the absence of flowering, as well as the deformed growth of the leaves.

In recent years, this indoor plant has gained an important place in passionate collections in Romania due to the large number of hybrids in the world, that have many shapes and colors and are well adapted to our apartment indoor conditions. It is an ornamental plant that in the past was only known particularly as a cut flower, but in recent years it is increasingly appreciated as a potted plant due to the special elegance of the contrast between the dark color of the leaves and the vivid color of the flowers.

In Romania the cultivation is only possible in interior spaces, where optimum growing conditions can be provided, as extensive heat, humidity and light, but without direct sunshine. Ground cultivation of *Anthurium andreanum* was practiced in Romania at the Palm Oil Research and Production Center in Cluj, but lately, due to the unfavorable price conditions, it was abandoned. Research has also been carried out until 1990 at the Research Institute for Floriculture, in the Berceni laboratory in Bucharest.

Incorporating nature into interior design [14] can have an important role in creating environments that promotes physical and mental health of people [10].

Until recently, limited attention has been paid to plants and their role in the interior space [13], but ornamental plants have gradually become an integral part of interior design [8] in the current society context.

The use of indoor plants in design is steadily increasing the study of their abilities to remove volatile organic compounds and, implicitly, to improve indoor air quality. International studies of plant lifetime benefits are for more than 30 years research, so this fact justifies the need for similar studies in our country to be adapted to indoor conditions and finding solutions to integration ornamental plants with sanogenic properties in interior design [11] as *Anthurium andreanum*.

Research data made on the effects of ornamental plants relative to indoor air quality, based on experiments and

studies are showing that plants effectively improve indoor air quality by removing toxic chemicals [11]. According to Bakker's model (2009), people respond to plants in three ways (Figure 1): a physical/

physiological response, an affective response and a cognitive response [3].

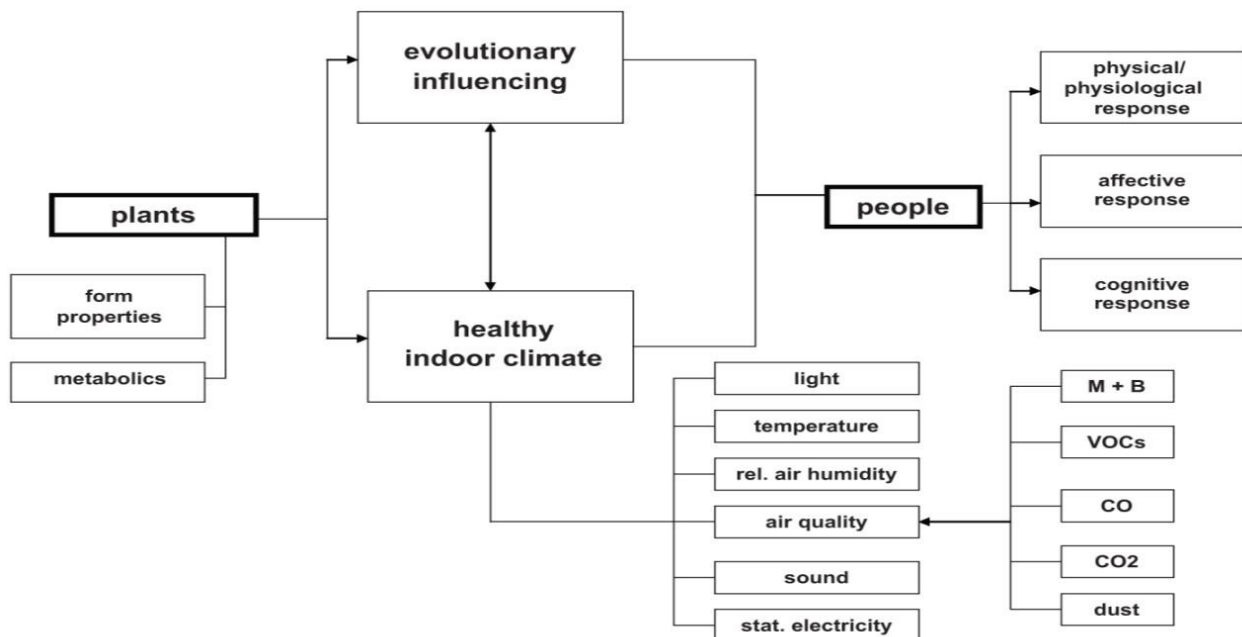


Fig. 1. Conceptual model on the impact of plants on people, Source: Bakker, 2009.

Air quality has been important since ancient times, and concerns over this issue are mentioned even in the Bible (the negative effect of living in a damp house). The need for "clean air," was identified in 1781 by Antoine-Laurent Lavoisier, in the work of whom it was described the metabolic roles of oxygen and carbon dioxide. In last decades, following this research evolution, carbon dioxide has become a decisive marker for air analysis [15].

Indoor air quality is expressed as the extent to which human requirements are met [12]. By definition, an acceptable indoor air quality is defined as the air in which are no contaminants at harmful levels and, as a consequence, the majority of people (about 80%) are satisfied [2].

During the 1980s, laboratory studies reported that indoor plants can reduce the level of airborne contaminants, including formaldehydes, benzene, carbon monoxide and nitrogen dioxide [16].

The plant air filtration study was conducted by the National Aeronautics and Space Administration (NASA) in association with Associated Landscape Contractors in America (ALCA) published results suggest that some ornamental indoor plants can provide a natural solution to cancel toxic agents from the indoor air, for example *Anthurium andreanum* plant can absorb formaldehyde, xylene, toluene and ammonia [16, 18].

Plants can also improve the quality of the indoor environment. Research from the John C. Stennis Space Center in Mississippi showed that plant spaces contain

50% to 60% fewer molds and bacteria in the air than plants without plants [9]. Various research have shown that plants can significantly reduce the concentrations of nitrogen oxides (NO_x), sulfur oxides (SO_x); ozone (O₃); carbon monoxide; formaldehydes; benzene, toluene and suspension particles [11].

Materials and Methods

Etymology – origin of the plant

The botanical name of the genus comes from the Greek words 'anthos' - flower, 'oura' - tail, the bloom being related in form to the flamingo bird, refers to the flower shape of this species, which is a flat or convex spade, that initially protects the cylindrical spines [1]. Other common names used are ail flower, boy flower or flamingo flower [19].

Anthurium is specific to the tropical America, from arum botanical family (*Araceae*), more precisely in the mountain areas of Costa Rica, Panama, Brazil and Columbia. Commercial crops have been established in recent years worldwide, but the largest producers are the United States of America (Florida) and the Netherlands [4].

The *Anthurium* genus comprises about 300 species. One of the most cultivated is *Anthurium andreanum* Lind. (*Anthurium x cultorum*) and an extremely beautiful species was discovered in Colombia by Edmond Ambre in 1894 [17].

Morphological characters

Anthurium (Figure 2.) is an evergreen perennial plant, with a root system formed by rhizomes, strong and thick, starting from the adventitious roots, this type of rooting being characteristic to the *Araceae* family. The flowering stem grows to heights of 30-80 cm and at the more developed plants, the stem adapts as a climbing plant [17]. Simple or palmately lobed leaves [19], *Anthurium* has a length of about 25-30cm/15-20cm, depending on the cultivars, a lanceolate or cordiforme shape, skinny, green, glossy [5]. *Anthurium* flowers are small and develop crowded [17], spike-like flowering spadix, each subtended by a colourful flat spathe [19], the inflorescence is large, about 8-20 cm

long, fleshy, glossy, colorful red-carmine, pink and white. The spadix is straight or slightly curved, 10 cm long, white or yellow colour. Is a dioecious plant, so on the spadix are formed the female and male flowers and the fruit are reddish red drupe [17].

The "true" flowers are located on the spadix and are hermaphrodite, characterized by the phenomenon of protandria, when, at the first time, the female sexual elements are formed and only after a month, the male flower part can appear, so this erases the possibility of self-pollination [1]. The seeds are small subglobose berries and the germination takes from 1-3 weeks in most cases, but may take longer in some species [19].



Fig. 2. *Anthurium andreaeanum* L. varieties

Morphological characters on selected varieties

Anthurium andreaeanum L. (Otazu variety): defined as dark backspace, red to cherry, white to yellowish, medium to large, with 8-10 flowers/plant and 14-22 bright green leaves, varies between 15 to 22 cm lengths.

Anthurium andreaeanum L. (Baleno variety): defined by the pink-red flowers, with green spadix, they produce 8-10 flowers/plant, as a medium size and the large leaves reach the saddle 20-24 pieces/plant.

Anthurium andreaeanum L. (Alabama variety): described by the red back flower color plants, up to 15-20 cm in height, rich in foliage.

Anthurium andreaeanum L. (Cherry Champion variety): marked by the pink to red flowers, medium-sized, starting from 6-12 and up to 26 leaves/plant.

Research subjects

Researches, observations, biometric measurements and the maintenance of different *Anthurium* varieties were conducted and studied during 2009-201, at teaching greenhouses of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. The study material was imported from the Netherlands and consists to four

red flower varieties of *Anthurium* grown in pots: Baleno, Alabama, Cherry Champion and Otazu.

Anthurium varieties studied were placed in randomized blocks of three rehearsals. Each variety was a variation and for each variety there were 5 plants per rehearsal, so 15 plants per variety, resulting in a total of 60 plant pots per experience. During the vegetation period, a proper care was applied to the culture of *Anthurium* grown in pots and was paid particular attention to combating diseases and pests. On the studied varieties measurements were made and determinations of the following characters: the color of the flowers, the length of the stem and the leaves, the average width of the back, the length of the floral back and the number of flowers obtained on each plant.

Data analysis

All the obtained data was analysed using descriptive statistics, explained, evaluating average, testing the difference between variants and the variability coefficients using the Statistics 10.

Results

Analyzing the quality and number of blooms at *Anthurium andreaeanum* species, the result is given especially by the quantity and number of leaf. In the linear correlation between the four red flower cultivars of *Anthurium andreaeanum*, for example at the **Otazu** cultivar, following the correlation coefficient

between the amount of blooms and leafs number, we obtained $r=0.94803$ (Figure 3).

Comparing this value with the correlation coefficient at 95% and 99% levels of significance, R-squared values of 0,95 and 0,83, respectively were obtained. Thus, it can be stated that, between the average number of leaves and the average number of flowers, is significantly positive, expressing a close connection.

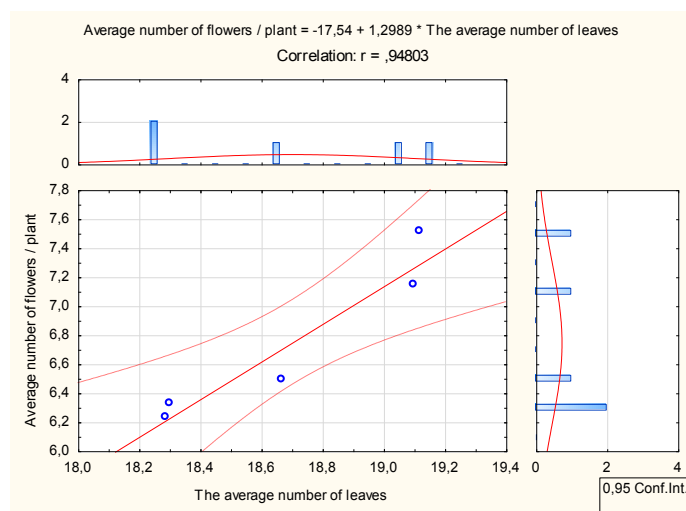


Fig. 3. *Anthurium andreaeanum* L. Otazu variety

Between the average number of leaves and the average number of flowers at the **Baleno** variety, the R-squared value decreases to 0.82234.

The correlation is distinctly positive and the regression equation is $-13.97 + 1.1064 \cdot \text{the average number of leaves}$ (Figure 4).

The relation between the two variables estimated by simple linear regression is illustrated by the following linear equation: $y=3.224 + 50925 \cdot \text{the average number of leaves}$ and R-squared of 0.50252 (Figure 5). Based on these comparisons, it can be concluded that there is a significant link between the average number of leaves and the average number of flowers in the **Cherry Champion** variety.

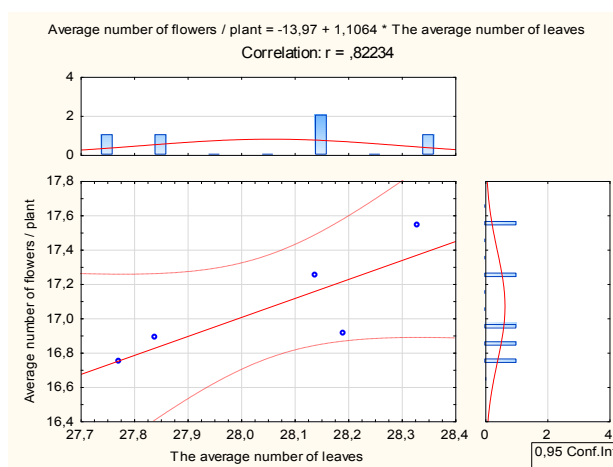


Fig. 4. *Anthurium andreaeanum* L. Baleno variety

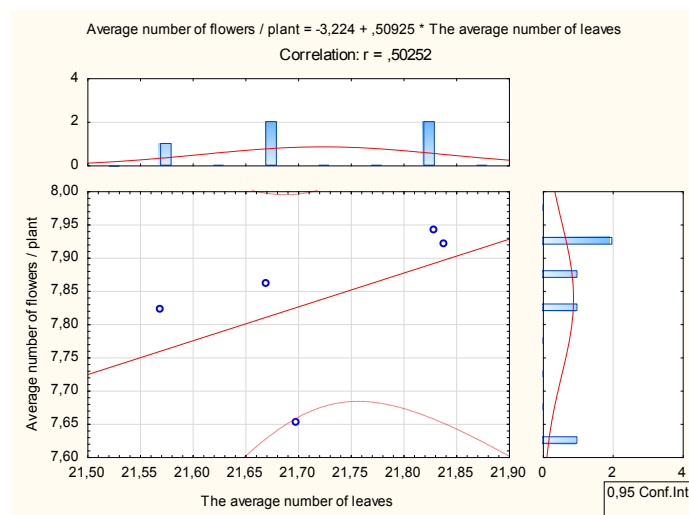


Fig. 5. *Anthurium andreanum* L. Cherry Champion variety

The correlation for *Anthurium andreanum*, **Alabama** cultivar correlation shows that between the average number of leaves and the average number of flowers at the Alabama variety is a close link between the two

variables, the find R-squared of 0.79250 is distinctly significant. This means that with the decrease in the number of leaves there will be fewer flowers (Fig. 6).

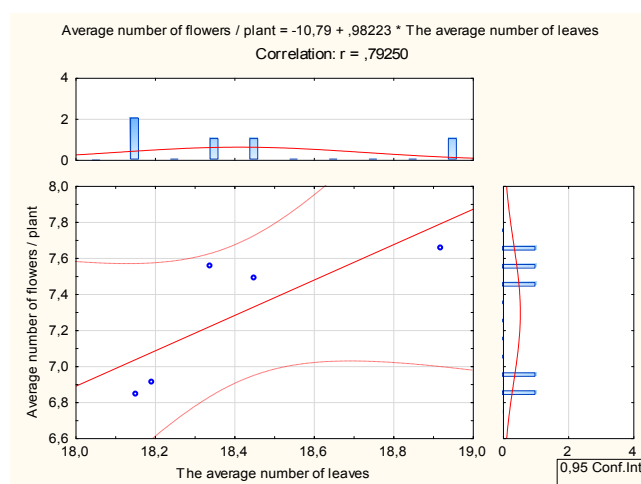


Fig. 6. *Anthurium andreanum* L. Alabama variety

Conclusions

In this work, we tried to assess the influence of pot grown *Anthurium* varieties using the Statistics 10 scale. The data achieved on the length of the floral stem reveals that there is a very high variability of this character within the studied varieties. For all the studied varieties, the comparative analysis showed that the average number of leaves and the average number of flowers/plant are in close connection. The **Otazu** variety for *Anthurium andreanum*, under experimental conditions had the best results. Moreover, based on the obtained results, *Anthurium andreanum* L. is recommended for the pots cultivation in Romania, varieties that are characterized by superior morphological and decorative characters. These

varieties can be used as indoor plants for design element. The results show significant main effect of how, Otazu variety is a plant that, in the past was particularly known as a cut flower, but in recent years it is increasingly appreciated as a potted plant, for the special elegant shape, perfect contrast between the dark color of the leaves and the vivid color of flowers. However, as already described, further investigations are still needed due to the values of the variability coefficients used in the amelioration of this species.

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