





Genetic variations within a collection of anthuriums unraveled by morphological traits and AFLP markers

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Abstract

In this study, genetic variations among a collection of anthuriums were comparatively investigated using morphological traits and amplified fragment length polymorphism (AFLP) markers. Both morphological and AFLP-based data clustered the accessions from Anthurium andraeanum, *Anthurium scherzerianum*, and *Anthurium clarinervium* into three separate groups, with a significant though low correlation ($r=0.3$) observed between the morphological and AFLP-based similarity matrices. The AFLP-based principal coordinate analysis (PCoA) divided the entire accessions into three parts, reinforcing the AFLP-based clustering. Moreover, the Bayesian-based structuring assigned the anthurium accessions to three subgroups but with 27 accessions retained in the admixed groups, probably implying the highly heterozygous genome of the investigated anthuriums. The findings of this study

would add new knowledge of genetic diversity among anthuriums as well as embark on a useful beginning for a rational hybridization breeding for anthuriums in future.

Highlights

- ▶ Both morphological and AFLP-based data clustered the accessions into three main clusters.
 - ▶ The clustering results were well concordant with the botanical classifications.
 - ▶ The morphological and AFLP-based similarity matrices were significantly correlated.
 - ▶ Bayesian-based structuring assigned the anthuriums to three subgroups but with 27 accessions in admixture.
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Introduction

Anthurium (Areaceae), native to Central and South America, is one of the most popular ornamental crops. The attractive characteristics including vibrant inflorescence with straight spathe, candle-like spadix, exotic foliage, and particularly the long lasting 'flower' of anthurium have ensured its great commercial importance, and therefore anthuriums have currently occupied a large part in flower industry, especially in terms of cut-flower and potted ornamentals. Now, demand for new good quality varieties of anthuriums is increasing. Many attempts have been made to increase the diversity of anthuriums to meet the preferences of different groups of people (Elibox and Umaharan, 2008, Avila-Rostant et al., 2010).

Complete knowledge of genetic diversity is indispensable for efficient utilization of genetic resources and effective breeding. By far many studies have attempted to address the genetic diversity of anthurium accessions (Ranamukhaarachchi et al., 2001, Acosta-Mercao et al., 2002, Devanand et al., 2004, Nowbuth et al., 2005, Andrade et al., 2009, Yasin and Mayadevi, 2010, Gantait and Sinniah, 2011). However, anthurium germplasm could by no means be thoroughly characterized due to the localized and limited samples in the previous published articles, and therefore necessary to assess the genetic variability within a specific collection of anthuriums.

In the present study, we aimed to address the genetic variability of the commercial varieties currently cultivated in China and recently selected hybrids of anthurium based on morphological traits and AFLP markers. The findings of this study will add a new knowledge

with respect to genetic diversity of anthuriums and therefore facilitate a rational breeding design in future.

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Plant materials and phenotyping

In this study, 60 accessions of anthuriums, a representative of the commercially cultivated gene pools in China, were selected. Of the 60 accessions, 57 accessions were from *Anthurium andraeanum*, two from *Anthurium scherzerianum*, and one from *Anthurium clarinervium*. In addition, the cultivated varieties were encoded with a suffix An, and the recently selected hybrids with a suffix S (Table 1). An4 and An44 are *A. scherzerianum* and An6 is *A. clarinervium*. For the S-coded accessions, S1–S3 were...

Morphological clustering

Based on the nine investigated morphological traits, pair-wise similarity coefficient varied from 0.65 to 1.0. The sixty anthurium accessions were classified into three main groups (I, II, III) at similarity coefficient of 0.70 (Fig. 1). Group I consisted of all accessions from *A. andraeanum*, group II the two accessions from *A. scherzerianum*, and group III the accession from *A. clarinervium*, well concordant with their botanical classification as depicted in Table 1. The group I could be further ...

Discussion

A complete knowledge of genetic variability among crop germplasm is a prerequisite for rational management of genetic resources as well as for successful crop improvement (Gowda

etal., 2011). Recently, some efforts have been focused on the genetic diversity and relationship among anthuriums. Ranamukhaarachchi et al. (2001) identified the genetic relationship of nine potted anthuriums with RAPD markers. Yasin and Mayadevi (2010) reported a high genetic diversity among 12 commercial varieties of ...

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